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Urban Freight Transport in the context of Urban Development

Master of Science Thesis in

Supply Chain Management and Production Engineering

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Abstract

In this thesis the interaction between urban freight transport and urban development is studied. The thesis focuses on the material infrastructure i.e. urban transport network and logistic nodes as a measure to affect the freight transport within the urban area. The land use patterns are used to identify the freight generating nodes and further on the dynamics of these nodes within cities are investigated. Four European cities of Gothenburg, Hamburg, London and Lyon are chosen as cases to study the theories more thoroughly. It is shown that the freight generating nodes are forced to move due to developments in urban areas while this movement is leading to renewal and regeneration projects. In addition it is noticed that the government has a great influence on the location of freight generating nodes within city areas especially through provision of transport networks. Therefore the position of freight transport in the decision making context is studied as well. As the result of the project, the case cities were mapped based on the study boundaries, freight transport gateways and networks and the location of freight generating nodes. The study shows that there is a lack of knowledge and involvement about the subject of freight transport in city planning in the case cities while this issue is started to be more considered.

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Table of Contents

List of figures

List of tables

1. Introduction

This thesis is assigned by Volvo 3P with the general purpose of studying the relationship between urban freight transport and urban development in European cities. The investigation has been done through study of four European urban areas with the focus on the land use and infrastructure. In this chapter the background to the company as well as the subject of urban freight transport are introduced. Further on the purpose and the outline of the following chapters are presented.

1.1. Company background

The Volvo Group is one of the world's leading providers of commercial transport solutions, providing such products as trucks, buses, construction equipment, engines and drive systems for boats and industrial applications, as well as aircraft engine components. To meet the need of customers in future, Volvo Group needs to follow the business model around the transport solutions and to investigate its stability. This will help the company to see the future vehicles' profile. To do so, it is necessary to follow the development trends and policies in different market segment in different parts of the world. Considering the fact that nowadays high percentage of world population lives in cities and a big part of transportation is initiated or ending up in cities, it is more of interest to study these trends and policies within urban areas in particular. This will enable the company to offer and provide customized services for each and every city. However for this goal to be economically feasible, the company needs to seek for economies of scale. That is the reason which makes the synergies and similarities between customers (here cities) very interesting and fundamental. Furthermore, the company's social responsibility put demands for finding ways that Volvo Group can improve transport solutions especially in cities (as the most challenging areas) using its skills and expertise. This at the same time will add value to the brand and will build trust through long term commitment. (Rosgardt, 2011)

In order to achieve these goals several studies have been either done or planned throughout the company. The current thesis is also assigned by Volvo 3p as a part of this approach.

Volvo 3P as one of the companies of Volvo group defines its mission as "To propose and develop profitable products to ensure a strong competitive offer for each Volvo Group truck company, based on common vehicle architecture and shared technology". The company's responsibilities are divided in four main groups as below (Volvo Group Global):

- Product planning
- Product range management
- Product development including Global Engineering and Global Vehicle Development
- Purchasing

Volvo 3P describes its challenge to enhance all truck brands competitiveness in all market segments with focus on solutions to fulfill the needs of the future customers (Volvo Group Global).

1.2. Challenge of urban freight transport

Freight transport is an essential part of urban life which enables people to have access to the products they require whenever they want (Behrends, Lindholm, & Woxenius, 2008). As Ogden (1992, p. 3)

mentions, “No urban area could exist without a massive, sustained and reliable flow of goods to, from, and within it.” The goods movement or freight transport has a significant role in the economy of urban areas as it is a source of income as well as employment (Russo & Comi, 2010). Urban freight costs are almost 5% of GDP which is comparable to the magnitude of people transport cost and these costs increase with the size of urban area at a higher rate than passenger transport. (Ogden, 1992) In addition Russo & Comi (2010) state that the competitiveness of an urban area is highly dependant on an efficient freight distribution. Urban areas are habitat of over 72% of the population and it is going to rise to almost 84% by 2050. An urban area consists of inter-related activities and human demands which are spread all over this area. Therefore, an efficient transportation system is needed to connect different activities and to fulfill various demands and it should ensure a long-term growth and development (Anderson, Allen, & Browne, 2005).

Based on Dablanc & Rodrigue (2009) “Three to five percent of urban land is devoted to freight transport and logistics. A city not only receives goods, but also ships them: 20 to 25% of truck-km in urban areas is outgoing freight, 40 to 50% are incoming freight, and the rest both originates from and is delivered within the city.” Urban freight transport includes various types of deliveries such as independent retailing, chain retailing, food deliveries, parcel and home deliveries, construction sites, garbage collection and disposal (Dablanc & Rodrigue, 2009). There is also another kind of freight that just passes through the city without any departure or destination point within the urban area. This shows why urban freight transport is a complex and heterogeneous subject and it is very difficult to fulfill the requierments of different actors involved in it (Ogden, 1992).

Although urban transport is an important indicator of an urban area’s growth and employment, it results in increased traffic which in turn leads to congestion, air and noise pollution. Urban freight transport is closely associated with the quality of life within urban areas. There are various problems in this regard which are either caused or affecting the transportation of goods in cities. Insufficient infrastructure along with access restrictions prevent the goods vehicles to perform properly in city areas which in return may cause traffic and safety problems. On the other hand the congestion resulted from goods vehicles have negative impacts on people and freight accessibility which in return imposes extra costs for both passengers and freight companies. Freight transport affects the quality of life negatively also by its contribution to the emission of pollutants in local and global level and increase of the noise level in the neighbor areas. Safety is another angel in the life quality which is violated by transport of goods especially on roads inside urban areas. This problem might be the result of inadequate loading/unloading spaces, dangerous driving or the characteristics of the vehicle and the load.

Different aspects of urban freight transport, as it is briefly mentioned above, highlight the importance of this subject and “the potential value of targeting it for specific treatment in a policy or planning context.” (Ogden, 1992, p. 22)

Urban freight transport was directly addressed by researches in 1970 Since then different issues of freight transport in urban areas have been studied and some issues were emphasized more in different periods (Ogden, 1992). However freight transport is ignored to a large extent in city development planning and as Lindholm (2008) shows there is a lack of awareness, knowledge and information about

freight transport role in sustainable development (Lindholm, 2008). This can be explained by the fact that up to now cities were seen mainly as places for inhabitant living, commuting, commercial, leisure and cultural activities and the main focus has been on people transportation (Rodrigue, Comtois, & Slack, 2009). Based on Dablanc (2007, p.282), "local public policies regarding freight are scarce and out-of-date" and they do not cover the significant changes has happened in the production, distribution and consumption.

1.3. Purpose

The purpose of this thesis is to find a method to map a city based on its logistic nodes and flows and to apply the method to study how urban freight transport is affected by development's policies in European urban areas.

1.4. Outline

Chapter 1, **Introduction**, aims at providing a background to the subject as well as the company and why Volvo Group is interested in this issue. In addition the general purpose of the thesis is introduced.

Chapter 2, **Problem analysis through review of selected literature**, is organized to present the problem analysis and at the same time to provide a platform for the thesis analysis. The research questions as a result of the problem analysis are introduced at the end of this chapter.

Chapter 3, **Methods**, gives the research strategies, research designs and methods for data collection.

Chapter 4, **Case studies**, presents the data collected and gathered for four case cities. In addition the used method to map the case cities is explained at the beginning of this chapter. Chapter includes four sections representing each case city.

Chapter 5, **Analysis**, is organized in five subsections including individual analysis of case cities based on the framework introduced in chapter 2 as well as a comparative analysis based on the cities similarities and differences.

Chapter 6, **Concluding discussion**, aims at summarizing the main outcomes of the case studies and analysis.

Chapter 7, **Suggestions for further studies**, reflects the authors' suggestions for following studies based on what they have found out as missing in this context.

2. Problem Analysis through review of selected literature

The preliminary research questions proposed by Volvo 3p were to look into the interaction of urban freight transport with urban development in European cities and to suggest a method to map the cities based on the logistic nodes and flows. In order to narrow down the first research question an extensive review of related literature is done. This chapter only presents parts of the studies which results in the final research questions. These theories also provide a platform for the analysis of the case studies. So, it is difficult to distinguish the problem analysis from the frame of references. As a result the related theories are described with more details to be used as a framework for the analysis as well. The final research questions are presented in the last section of this chapter.

2.1. Urban freight transport: actors and measures

Ogden (1992) defines the urban goods movement as "the movement of things (as distinct from people) to, from, within and through urban areas" (Ogden, 1992, p. 14). Based on this, freight transport in urban areas refers to a wide range of transports including courier services, waste, construction materials and equipments, parcels, industrial deliveries etc. and therefore several actors with different interests are involved in the movement of goods within urban area: (Russo & Comi, 2010)

- Wholesaler, who is mainly interested in cost reduction and customer satisfaction
- Transport company, who is trying to reduce the cost while providing a quality transport for both parties (sender and receiver)
- The shop, who is interested to receive the parts in a specific time window with a short lead time
- The end customer, who is mainly interested in product variety and availability
- Public administration which can be considered as different levels of government. The main concerns in this category are efficiency of transport operations, external effects of transport and the city competitiveness in both economy and livability.

The number of actors involved, results in a complex system of relationships and decision making processes which all aim for a sustainable freight transport (Allen, Browne, & Woodburn, 2010) and at the end, results in different freight policies and measures implemented in urban areas. These measures and policies represent different time scale and have different effects on each actor. Russo & Comi (2010) classify all implemented measures within urban freight transport into four main groups to be able to identify the actors who are involved in decision making process and those who are affected. These groups are also associated with different time scales:

- "Material infrastructure": this group includes links in urban transport network as well as nodes associated with freight transport in urban area. These measures mainly aim at improving sustainability by optimizing the freight transport. Decision making in this group involves long term plans and requires capital investment.
- "Immaterial infrastructure (telematics)": This group includes information systems for improvement of the efficiency and effectiveness in freight flows and the information exchange between actors. Some instances are traffic information systems, route planning systems or vehicle maintenance management. Implementation of these measures is also associated with long term horizons.

- "Equipment": This group covers both handling equipments and vehicles and aims at changing the characteristics of vehicles driving inside cities i.e. emission. These measures are also considered within medium/long term time horizons.
- "Governance": All types of traffic regulations are classified in this group. They may have a medium term scale for example in road pricing or a short time scale in case of time and weight restrictions.

What mentioned above illustrates the wide extents of urban freight transport and consequently how complex its study may get. This is beside the fact that the study results may vary by taking different actors' point of view. So, in order to narrow down the study factors and to keep all research questions in the same direction, in this thesis the urban freight transport is only studied in connection with *material infrastructure* and the public administration point of view is investigated. Since the ultimate goal of this thesis is to study freight transport in specific cities, material infrastructures are considered to be more relevant as they are directly dependant on city characteristics e.g. historical heritage, culture, geography, economy and political situation. Since the public administration has a significant role in planning and development of material infrastructure within urban areas, this point of view seems to be the most important to look into.

2.2. Transportation and activity system

"The unique purpose of transportation is to overcome space". It plays a major role to provide links between locations, people and economic activities. Locations have different charactesrics based on activities happening there. The characteristic can be supplier, consumer or producer of resources and services. That is why locations need to exchange people, goods or information. (Rodrigue, Comtois, & Slack, 2009)

Sjöstedt (1996) uses a system model to define the words Transport, Traffic, Land use and Accessibility and how they are related. As it is illustrated in Figure 2-1, human activities are the drivers of this system. Since activities should be done in specific facilities and facilities are spatially distributed, accessibility is needed. Based on this definition accessibility shows the ability to move from one location to another. This change of location is called transport while movement of vehicles along different links of a network is called traffic (Sjöstedt, 1996). Rodrigue, Comtois, & Slack (2009) define the transport network as "the framework of routes within a system of locations, identified as nodes".

Finally land use refers to "certain facilities at certain locations in relation to the infrastructure which is intended for a certain human activities". In this model infrastructure consists of all facilities which make transport possible. (Sjöstedt, 1996, p. 74)

The Sjöstedt model considers both people and goods movement. However since it does not include the interaction between these two, it is possible to use the model to analyze only freight transport while geographically focus in urban areas as it is used by Lindholm & Behrends (2010). As it is explained in section 2.1, the focus in this study is on material infrastructure e.g. transport network within an urban area and freight related nodes. This focus corresponds to the lower part of Sjöstedt model: facilities, land use and infrastructure which are shown in Figure 2-1.

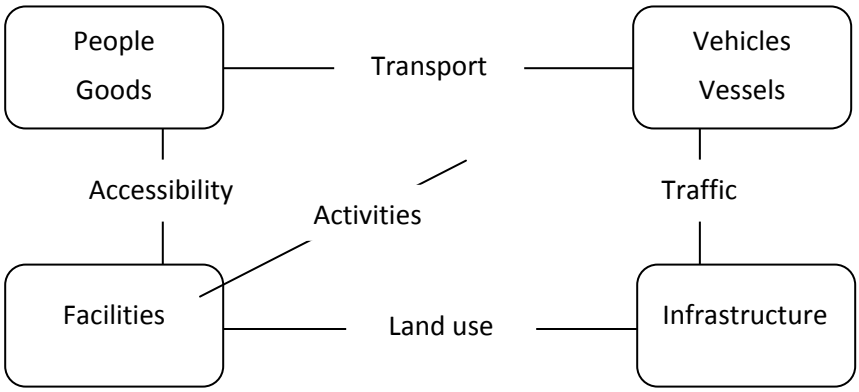

Figure 2-1 System model of Land use, Accessibility, Transport and Traffic (Sjöstedt, 1996)

2.3. Freight transport and urban form

An urban area as a cluster of activities consists of several urban developments in different sizes, types, land uses and locations which comprise the urban form (Allen & Browne, 2010). Urban form is also defined as the spatial arrangement of urban transport systems and related physical infrastructures (Rodrigue, Comtois, & Slack, 2009).

In contrast to the large amount of researches about the relationship between passenger transport and urban form, "there has been no comparable research" regarding the interaction of urban freight transport and urban form. (Allen & Browne, 2010, p. 6) However, this issue is discussed briefly in some literatures which are presented in this section.

Due to social, economic and technological changes in an urban area physical changes happen in the urban form. These changes affect on urban freight transport due to the alteration of commodities, the location of departure and destination points, traffic flow, frequency of deliveries and the time of freight movements. (Ogden, 1992) The location of freight nodes affects the length of the journey, speed and choice of modes. (Allen & Browne, 2010) Freight transport as well affects the urban form. Selection of a place as a freight node plays an important role in the usage of the land in the area and urban sprawl. (The expression of Urban sprawl will be defined in section 2.6) Therefore, poor decisions regarding the location of freight nodes and inadequate transport infrastructure have adverse effects on urban freight transport. In addition, location decisions should not only be based on access to market and raw material but also on dependable transport networks. (Ogden, 1992)

On the other hand, the size and density of cities is a key factor affecting the urban form. A large city means more distance between departure and destination points and more time of traveling while a dense city has greater congestion and consequently higher costs of transport. (Ogden, 1992) Nevertheless, higher levels of mixed land use- higher diversity of activities in a specific area- might provide the possibility to decrease the total distance traveled due to the reduced distance between successive destinations in a milk-round trip. Regarding the local distribution facilities, the increased

number of these facilities in urban areas lead to shorter distance of travel and less time consumption; nonetheless, it might increase the frequency of transportation due to the decreased cost of transport. (Allen & Browne, 2010)

2.4. Freight generating nodes in the urban area

The spatial location of activities creates the land use pattern which can be presented in formal or functional way. In formal land use pattern "representations are concerned with qualitative attributes of space such as its form, pattern and aspect and are descriptive in nature" while a functional land use pattern is associated with "the economic nature of activities such as production, consumption, residence, and transport, and are mainly a socioeconomic description of space". (Rodrigue, Comtois, & Slack, 2009) As it is illustrated in figure Figure 2-2 the land use pattern can be used to identify the distribution of activity nodes and their intensity within an area. In this thesis where the land use pattern is mentioned the functional definition is meant.

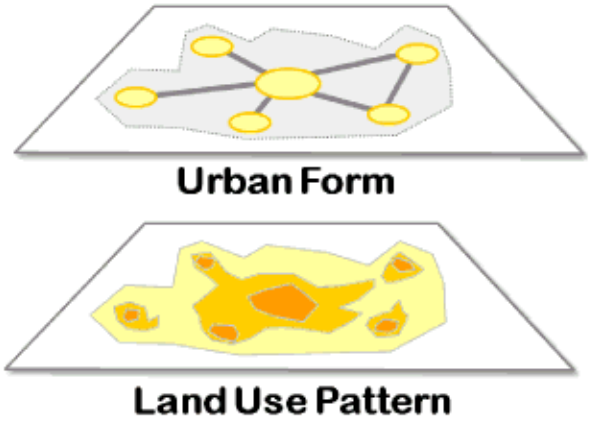

Figure 2-2 the relationship between land use pattern and the activity nodes (Rodrigue, Comtois, & Slack, 2009)

There have been many attempts to model the land use pattern in urban areas in order to describe and analyze it. The result is several modeling methods which represent more and more complexity over time. One of the latest models is hybrid land use which tries to combine the strong points of previous models. Hybrid land use is designed based on the effects of centers and sub centers as well as transport axis on urban development. This model is recommended for the study of urban form's evolution. Figure 2-3 is an illustration of the hybrid model. (Rodrigue, Comtois, & Slack, 2009)

Based on the hybrid model, different land uses within an urban area can be categorized into Center, Industrial/Manufacturing, Commercial and Residential. These categories may be divided into sub categories in different studies based on the required level of detail.

Allen & Browne (2010) argue that the transported freight within the residential areas mainly includes home deliveries and waste collection which is rather small in comparison with the total freight moving to, from, within or through urban areas. So the majority of freight is transported via major transport networks. Based on this argue in this thesis the residential areas are excluded from freight generating nodes and the focus in case studies are on Center, Industrial/Manufacturing and Commercial uses.

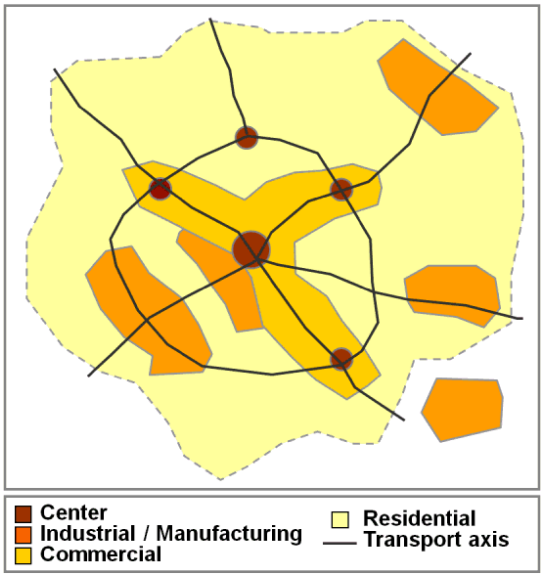

Figure 2-3 Hybrid land use model (Rodrigue, Comtois, & Slack, 2009)

2.5. Dynamics of freight nodes

There are two different forces which affect on the spatial alteration of freight nodes. First of all, international trends such as enormous economical changes and technology improvements cause structural changes in the location of freight nodes. On the other hand, there are drivers and barriers stem from national policies including market forces and government rules which lead to spatial changes of these nodes such as gateways, warehouses, industries etc. In the section below, the motives of these geographical changes are presented more thoroughly.

2.5.1. Global trends

During recent years, massive changes have happened in distribution and logistics. (Hesse & Rodrigue, 2004). Technological innovations have transformed speed, flexibility and reliability which are three main criteria in field of logistics and distribution service. In addition, the shift from mass production to more customized production system put a higher demand on mass distribution systems and is dependent on the use of large warehouses. On the other hand, with the recent shift towards lean and just-in-time, the need for a lean distribution system has been commenced which aims to decrease the time and the cost of moving products and keeping them in inventories. The major elements of the lean distribution system are Electronic Data Interchange (EDI), barcode systems and distribution centers. (Dicken P. , 2011)

The improvements in information technology led to E-commerce which changed the physical distribution systems. The new system of distribution depends on large warehouses outside of the metropolitan area and lots of small parcels which are transported by vans and small trucks to different

buyers. (Rodrigue, Slack, & Comtois, 2001) The concentration of production/distribution facilities in few regions which led to more distribution results in more and longer transport. Furthermore, the concentration of companies on core activities and outsourcing of non-core functions have been a main trend in recent years. (Emberger, 2001) This latter approach as well as the spatial centralization of warehousing activities in which companies have reduced the number of warehouses and instead have used larger supply centers for broad areas (McKinnon, 2009), requires the transport capacity for the related activities and influences on different transport modes, the location of warehouses and the flow of material. (Ogden, 1992)

2.5.2. Drivers and barriers

There are two main groups who can influence and improve the freight system: "governmental organizations (at international, national, regional and local levels)" and "companies" (Allen, Browne, & Woodburn, 2010, p. 88) which are referred as *Public sector* and *Private sector* respectively in this report. In this section the influence of these two different sectors on freight nodes is presented. First *market forces* which are mainly based on economy (Dicken P. , 2011) are discussed and in the later section, government or "nonmarket" forces are introduced.

Market Force

The selection of freight facilities location is a trade-off between land price and distance to the final distribution points (Hesse & Rodrigue, 2004). Considering accessibility, the optimal location for freight facilities is the center which has an optimal accessibility to the market. However, the rent of a land is a function of the availability of land and so, central areas have the highest rate and the rent decreases dramatically while moving away from the center since available lands increase. The land-use of an area is dependent on the ability of different economic actors to pay the rent for that area (Rodrigue, Comtois, & Slack, 2009). Quick information transfer, consumers' preferences changes and close competition put high pressure on supply chain which in turn, influence on the current location of freight facilities. For these companies, competitiveness means increasing the throughput and offering low rates service which leads to relocation of them to low cost areas, connecting more distant places and covering broader areas (Hesse & Rodrigue, 2004). "Suburban sites" in comparison to "core urban areas" provide larger and cheaper lands, and unrestricted transport access, in addition to advantages of connecting local and long distance flows. As a result, the freight facilities recently are constructed in metropolitan areas, "at the urban fringe or beyond" (Hesse & Rodrigue, 2004, pp. 178,179).

The above discussion by Hesse and Rodrigue only provides the baseline to compare suburban areas and core urban areas, not giving the possibility to compare different suburban areas to each other. So Ogden's opinion which covers more criteria in this regard is introduced here. As Ogden (1992) states there are four main factors which influence the location of freight facilities:

- Closeness to the main roads, freeways and services
- Closeness to customers
- Site availability
- Labor availability

Among these factors proximity to main roads has the greatest influence. In addition, several other factors are influential for the consideration of a location for freight facilities which among them sufficient site area, adequate road capacity, no restriction on truck operations in the area, possibility of access by largest vehicles and no undesirable noise or zoning restriction can be mentioned. (Ogden, 1992)

Decision-making structure

Governmental structures are influential on cities decision-making processes. Some cities have independent governance while other may have several layers in their governmental structure. These different levels of structure have different responsibilities and roles in the city decision making. However these tasks and responsibilities may overlap in some areas such as land use and transport strategy. In these areas cities normally are not the only influencing body which can results in three main problems in the process of decision-making: (Institue for transport studies, University of Leeds, 2003)

- "Lack of direct control"
- "Intervention from other levels of government"
- "Involvement of other stakeholders"

Government tools

Public sector can affect freight transport in several major categories including transport infrastructure provision and management, pricing, behavioral changes, providing information and transport modes which might take place in different forms. The first form is regarding transport technology which tries to make a better use of existing resources, or in other words, to improve the supply of transport. The other method which is used by public sector is affecting the demand of transport by economic approaches such as increasing the price of transport or by financial incentives on a particular mode. The third approach is setting regulations in order to either restrict the usage of infrastructures and vehicles or define qualitative and quantitative controls to decrease undesirable practices. (Allen, Browne, & Woodburn, 2010)

One of the main aspects of public policy on urban freight is the government power in providing and maintaining of infrastructures. "Government has a virtual monopoly on the provision of road space and for that reason if for no other there is a public policy role in urban freight since virtually all intra-urban freight movements takes place on the road network." (Ogden, 1992, p. 195)

Governments also influence on the position of freight nodes. Some freight nodes are provided by government (seaports and airports); however, terminals (especially related to roads) are affected through planning process. The location and size of terminals influence on the flow of goods; nevertheless, it has a little influence in road investment decisions. (Ogden, 1992)

In addition, governments use several policies to influence industries within their boundaries. Two main policies in this regard are investment incentives and labor policies. Investment incentives can be capital related such as grants or loans for investment, or might be tax related such as tax reduction or tax exception. Regarding labor policies and due to the fact that governments are always concerned about

unemployment rate, they might use subsidies or training schemes to improve employment rate or to provide skilled labors. (Dicken P. , 1986)

Public private interaction

As mentioned earlier, public and private sector as different stakeholders in freight transport have various interests which should be satisfied and according to Ogden (1992), it is very hard to find an acceptable balance for fulfillment of these conflicting interests.

An example which shows the conflict of interests between public and private sector is the *Integrated Freight Center (IFC)* developed by public agency in Berlin – Brandenburg region in 1990 where a strategic location were devoted to freight activities. This place was located close to motorway intersections and incentives were paid to attract companies to move there. Meanwhile, a land development project called *Magna Park* started by a private company. This private company did not want to move to the IFC, they selected a location with an excellent access to the intersection of motorways, close to Berlin with a cheap price (even compared to the subsidized area in IFC). The location of Magna Park was not according to the regional land use policies since it could contribute to urban sprawl; however, this project was permitted due to the job opportunities it could create for the region while other factors such as traffic flow, environmental effects and even strengthening of the IFCs were not considered. (Hesse M. , 2004)

Public Private Partnership is one of the recent concepts favored by governments to decrease the contradictions between different parties and to ensure the participation of all actors in decision making processes. In its broad perspective public private partnership refers to information exchange, co-operation and communication between public and private sector in order to improve the implementation of new programs. This concept has already been tried in urban freight transport as a sector representing several actors and stakeholders. This new approach is the result of governments' awareness about the critical role of private sector in successful implementation of public policies and as a replacement for regulations. For example in the Netherlands, government in all levels try to encourage the businesses to behave in a particular way by providing resources or changing the regulations. (Browne, Nemoto, Visser, & Whiteing, 2004)

2.6. Urban development in European cities

Europe is one of the most urbanized continents on the earth. Although urban areas represent only for 1.5 % of the land surface of Europe (Reginster & Rounsevell, 2006), approximately 75% of its inhabitants live in cities. This figure will rise to nearly 80% by 2020 which calls for diverse demands for land in and around cities which may lead to *urban sprawl.* (European Environment Agency, 2006)

By definition, "urban sprawl means unplanned incremental urban development" (Piskorz & Goulet, 2009, p. 50). This phenomenon causes the development to jump over lands around the city and leave some parts empty which leads to low density urban areas (European Environment Agency, 2006). These empty lands may also appear duo to the relocation of some activities to outer parts of the city. Historically cities used to be the house of different types of industries. However due to the structural

changes during time cities are not the perfect places for many industries anymore as they are limited in space and access to broader markets. (Ogden, 1992).

European cities used to be quite compact historically comparing to the cities of the US. However urban sprawl is a common phenomenon in Europe nowadays and is increasing rapidly. Population used to be the main reason of this expansion; however, today sprawl has speeded up due to improved transportation links and enhanced personal mobility that make it possible for citizens to live far away from city centers yet fully utilize all opportunities offered in cities. The expansion of European cities by approximately 78% compare to the population growth of 33% proves the living preferences to be another driver for sprawl. (European Environment Agency, 2006) Table 2.1 summarizes the main drivers of urban sprawl and some examples of each.

Table 2.1 Main drivers of urban sprawl (European Environment Agency, 2006)

	Main groups of drivers	Subgroup examples
Drivers of City Sprawl	Economic factors	– Economic growth – Rising living standards
	Demographic factors	– Population growth
	Housing preferences	– More space per person
	Inner city problems	– Poor air quality – Noise – Social problems
	Transportation	– Private car ownership – Availability of roads – Low cost of fuel – Poor public transport
	Regulatory framework	– Weak land use planning – Lack of collaboration and coordination

In 2008 “Region-2020” was introduced by European Commission to present the future challenges in front of EU regions and as a consequence the European cities. Region 2020 discusses these challenges under main titles of globalization, demographic change, climate change and energy. EU policies have referred to these issues in the form of projects, suggestions and regulations among which the following areas are emphasized to be included in urban development and regeneration strategies (Piskorz & Goulet, 2009):

- Environmental Risk Management, in order to increase the awareness about the environmental impacts in cities and to decrease the negative effects.
- Sustainable Urban Transport Plans to decrease the CO_2 emission level and to increase the energy efficiency

- Sustainable construction, architecture and building culture and quality to improve energy efficiency and reduce the resulted CO_2 emission
- Sustainable urban design (appropriate land-use planning) to reduce urban sprawl and damages to the natural resources

Among all, the policies to reduce the urban sprawl are mainly directed toward the protection of the open area around the cities by making city centers more attractive for people to live, work and invest (Piskorz & Goulet, 2009). Urban renewal or development refers to the reuse of freed spaces within the cities as a result of relocations (Ogden, 1992) with the purpose of both making the best use of lands and improving the city livability.

2.7. Research questions

It is shown in section 2.6 that the urban sprawl is one of the current challenges of urban development in European cities which should be counteracted through land use planning and by reducing the waste of land within the urban boundaries. In addition theory suggest that how the city is planned and its land use outcomes will affect the way the urban freight transport will be treated in the future. The relocation of freight generating nodes has clear implications on departure and destination points as well as freight flows in terms of speed, modes, length of journey, density etc. These effects have a long term nature meaning that the planning perspectives today not only are going to be realized in long run but also if all aspects are not considered it would take long time to adjust what has been implemented. So considering these facts the research questions are structured as below:

RQ1- What are the main Land-use planning trends in European urban areas today In relation to the freight generating nodes?

RQ2- How urban freight transport is seen within land use planning in the case cities?

RQ3- Is there any pattern in relation to the recognized land-use trends within the case cities?

3. Methods

In this chapter the research strategies, research designs and data collection methods being used in this thesis are explained and discussed. Furthermore, a specific research process of this thesis is developed. In the end, quality of the research is discussed.

3.1. Research Strategy

Brayman & Bell (2011) recognize two different types of relationships between theory and research. In a deductive relationship the researcher reaches one or several hypotheses based on the available theories within the study area and then examines the hypotheses in the following process of empirical study. In the contrast, when the relationship is inductive the theory is the result of the research itself. It means that within the inductive process theory will be drawn out of the observations.

Another aspect of research strategy is whether the research is qualitative or quantitative. While a quantitative research is defined as a startegy which "emphasizes quantification in the collection and analysis of data", in a qualitative reaserch the focus is mainly on " words rather than quantification" during the data collection and analysis (Brayman & Bell, 2011, pp. 26,27). By the definition the quantitative and qualitative researches take inductive and deductive approaches respectively. Figure 3-1 shows the main steps of qualitative research process by Brayman & Bell (2011). However this recognition is not as clear as it sounds since the qulitative reaserch has been used in an deductive manner as well in order to examine the theory instead of proposing one (Brayman & Bell, 2011). Some reaserchers even argue that the tendency to use qualitative stategy to test the theories has been increasing during last years which is a sign of enhancing maturity in the startegy. That is the reason why stages 5a and 5b is added to the model in Figure 3-1. This shows that the theoretical work may lead to further data collection for the testing of the theory. (Brayman & Bell, 2011)

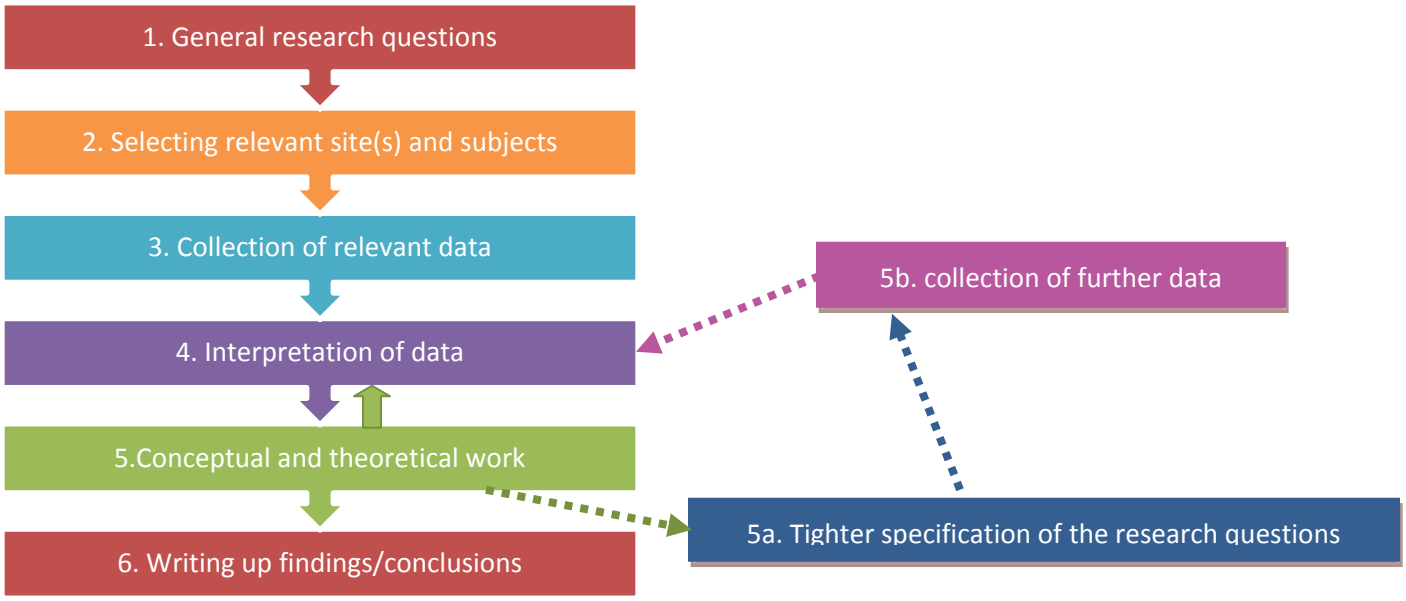

Figure 3-1 Main steps of qualitative research (Brayman & Bell, 2011)

So, considering the nature of reaserch area, the qualitative strategy is used in this thesis to test the available theories in this regard (deductive approach) based on the steps introduced in Figure 3-1. In section 3.3 the adapted model for this thesis is introduced and explained.

3.2. Research Design

The reaserch design provides a structure to present how different research methods should be used. Brayman & Bell (2011) recognize five main types of designs as follow: Experimental, Cross-sectional, Longitudinal, Case study and Comparative.

Brayman & Bell (2011) argues that the experimental design are rarely used in business and managemnt researches since most of the times it is not possible to reach the required level of control in these cases. A cross-sectional design refers to data collection from more than one cases at a single point of time. In this type of design to study the variations between cases it is required to have a "systematic and standardized method for gauging variables" e.g. the data should be quantitative or quantifiable (Brayman & Bell, 2011, p. 54). In a longitudinal design the aim is to map the changes. However due to time and cost limitations this type of design is not popular in business and management researches and it is mainly an extended survey research based on questionnaires or interviews. The case study design refers to detailed and intensive analysis of a single case. A case can be a single organization, a single location, a person or a single event. Comparative design refers to a situation when similar methods are used to study more than one case. Comparative design is built on the basis of better understanding of a phenomenon through comparison of contrasting cases.

Case study design is explaind further in this section as it is considered the most appropriate one based on the requirements of the thesis research questions.

3.2.1. Case study design

Based on Yin (2009), researchers can use case study design when: 1. The research questions include *how* and *why*, 2. Researchers have limited control on events, 3. The events are contemporary within the real-life circumstance.

Yin (2009, p. 18) suggests a twofold definition of case study:

1. A case study is an empirical inquiry that
    - Investigates a contemporary phenomenon in depth and within its real life context, especially when
    - The boundaries between phenomenon and context are not clearly evident.
2. The case study inquiry
    - Copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result:
    - Relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result:

- Benefits from the prior development of theoretical propositions to guide data collection and analysis.

Taking the current thesis project into consideration, it is observed that research questions are about *how* and *what*, observant does not have any control over the events happening in the context of the study and the events are contemporary in this circumstance. This thesis benefits from existing theories and seeks to gather data to examine these theories in the context of the project. Furthermore in data collection phase, it is tried to use multiple resources to increase validity of the results. All these features provide the authors enough proofs that case study best suits the qualifications of this project.

Case study design is not limited to study of only one case and "Multiple-case study" is very common in business and management researches (Brayman & Bell, 2011, p. 63). Brayman & Bell (2011) suggest that multiple-case studies should be categorized under "comparative design" as the comparison of cases is intended in most of occasions.

In case of available choices and resources it is recommended to do a multiple-case study rather than single one. This is due to benefits can be gained when performing the case study as well as in analysis. Analytic conclusions will be more powerful in multiple-case studies as there is no fear of the case conditions being unique or exceptional. (Yin, 2009)

Concerning the number of suggested cases in this study and available resources this thesis is designed based on multiple-case studies. The comparison between the data from 4 different European cities is used to benefit from similarities and contrasts within cases and to draw a stronger conclusion.

3.3. Research process

The research process starts with two main streams since the general research questions and 7 European cities as the preliminary case studies are suggested by Volvo 3P at the beginning of the project. These streams are shown in Figure 3-2. The process continues with further specification of general research questions based on the available theories within the study area. However there is an interaction between theoretical studies and further specification of the RQ 1 and RQ2. This is done mainly to keep the rest of research questions in alignment with the purpose, "to suggest a method to map a city based on logistics nodes and flows". Books and journal articles are the main sources of study in this part.

At the same time a pre-study is started to select the final cases among suggested ones. Due to the resource limitations number of the final cases is reduced to 4 cities. The pre-study is mainly done using virtual documents including websites of municipalities, research institutes and other organizations dealing with city planning and traffic issues.

Data collection starts with definition of a framework which is followed through the whole process. However in this process and further on in the interpretation of data there is an interaction with the theoretical studies and specification of research questions. As a result during this process both data collection framework and research questions are adjusted slightly. RQ1 is answered using a combination

of theories and collected data from all case studies. RQ2 and RQ3 are answered mainly by analysis of data collected from all cases and comparison of similarities and contrasts.

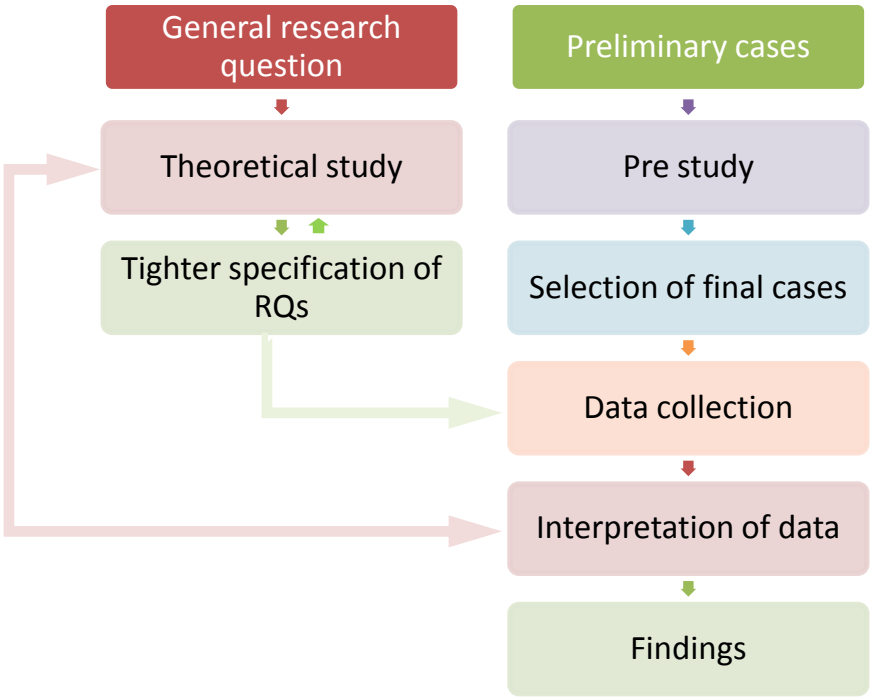

Figure 3-2 Research process

3.4. Data collection methods

"Most research questions are answered using some combination of secondary and primary data" (Saunders, Lewis, & Thornhill, 2003, p. 189). For specific types of researches that require studying and comparing national or international issues, secondary data might be the major source of information. However it is recommended not to rely entirely on secondary data (Saunders, Lewis, & Thornhill, 2003).

According to Brayman & Bell (2011), main data collection methods used within qualitative researches are: Participant observation, Qualitative interviewing, Focus-groups, Language based approaches and finally the collection and qualitative analysis of texts and documents. In this thesis qualitative interviewing and collection and qualitative analysis of texts and documents are used as the data collection methods.

3.4.1. Interviewing

Interview is a primary data collection method. It is one of the most common and important resources of information in researches and case studies. (Yin, 2009)

In a case study interview, instead of following a rigid list of questions, the stream of questions is more fluid. In other words, interviews are "guided conversation not structured queries" (Yin, 2009, p. 107). There are two types of interviews: in-depth interview and focused interview (Yin, 2009).

- In-depth interview: In this type, the interviewer can ask about both the facts and the interviewee opinions about a subject. It is also possible to ask the interviewee to propose his/her idea about an occurrence and then use these ideas for further inquiry. In addition, the interviewee might introduce new related people or documents in the interview. Therefore, this type of interview might take longer time and/or more than one sitting.
- Focused interview: These interviews take shorter time in comparison to the previous one. In this type also it is possible to have a conversational open-ended manner but it is more likely to follow a certain set of questions.

There is also another classification of interviews by Saunders, Lewis and Thornhill (2003) which is based on the form of interaction between interviewee and interviewer. In this matter, interviews are divided into one-to-one or one-to-many which one-to-one includes face-to-face interviews and telephone interviews and one-to-many include focus group interviews.

In comparison of phone and face-to-face interview, phone interview is favored when it is impractical to conduct a face-to-face meeting because of long distance, cost and time required. However, phone interview also has some drawbacks such as less reliability and trust between two parties, missing non-verbal clues, interpretation problems, connection problem and etc. So it is better to conduct a face-to-face interview when possible and use phone interviews in particular situations. (Saunders, Lewis, & Thornhill, 2003)

In the present thesis, face-to-face interviews are used when distance is not a barrier but for interviewees who are in other countries and in order to cut the cost, phone interviews are conducted. In many of the interviews, the authors are introduced to other related people or received further documents through follow-up e-mails. In addition, the interview questions are sent to the interviewees prior to phone interviews to overcome the interpreting problem and to be more time efficient. Most of interviews and all phone interviews are recorded and transcribed afterwards. However in some cases due to the time limitations or poor quality of recording, notes are made during the interview.

3.4.2. Documents

Here texts and documents are considered as the secondary types of data. In other words the documents in focus are those that are not prepared upon the request of the thesis authors but have been "simply out there waiting to be assembled and analyzed" (Brayman & Bell, 2011, p. 544). These documents can be either written such as notices, reports etc. or non-written such as pictures, recordings etc. Books, articles of journals, magazines and newspapers can also be included within the written documents. These groups of documents can be considered as both the source of raw and processed data (Saunders, Lewis, & Thornhill, 2003).

The main types of documents used in this thesis are journal articles, public documents (such as annual reports, mission statements, reports to stakeholders etc.) and virtual documents (documents that appear on the Internet). Since the nature of this study asks for a wide use of the Internet as the source of data, the virtual documents are explained separately in the following part.

Virtual documents

The use of virtual documents as the source of data in business researches is developing more and more. This is due to the increasing accessibility of the Internet as well as vast variety of available data. However to be able to use the internet as the source of data some criteria should be considered. First is the "authenticity" i.e. to check if the person who has given the information has the authority to do so. Second is the "credibility" i.e. to check the real intention of those who have provided the information. And finally the dynamic nature of the websites should be considered. (Brayman & Bell, 2011, p. 558)

3.5. Data Analysis

Based on Saunders, Lewis and Thornhill (2003), two strategies can be used in deductive researches. The first strategy is *Pattern Matching* when the researcher predicts "a pattern of outcomes" based on existing theories to explain what is expected to be found. The other procedure is *Explanation Building* in which the researcher try to "build an explanation" during data collection and analysis.

Both of these approaches are used in this research. The main part of the analysis is based on pattern matching where the existing theories are studied further in case studies and the outcomes are analyzed; however, some phenomena have been noticed first in case studies which will be studied in more detail in analysis part and related theories are presented there.

3.6. Quality of research

Brayman & Bell (2011) defines four types of reliability and validity regarding qualitative research:

External reliability means "the degree to which a study can be replicated". However some researchers believe that this is a difficult criterion in qualitative research since it is to "freeze" the social events to make a replication.

Internal reliability refers to the situation when there is more than one observer and it questions the agreement between members of the research team "about what they see and hear.

Internal validity shows if "there is a good match between researches' observations and the theoretical ideas they develop". It is one of strengths of qualitative research.

External validity refers to "the degree to which findings can be generalized". Some researchers argue that external validity, in contrast to internal validity, represents a problem when using case studies and small samples. However Yin (2009) objects this idea and suggests that case studies deal with analytic generalization and in this concept, the researcher aims to generalize some results of the case study to a broader area.

Regarding external reliability, since in this research land-use strategies which have long time horizon are studied, it is probable to get similar results if the study replicates after a short time; however, like any other qualitative research it is not possible to "freeze" the events. Concerning internal reliability and due to the fact that the research has been done by two researchers, it was tried to make the interpretation of the researchers more similar by extensive discussions and share of information. The four cities were divided between the researchers and each researcher consequently had more information about two of

the cities. However before the interviews and in order to equalize the level of information between researchers, a review of important data has been done by both researchers. Nonetheless the interviews were lead by the researcher who already had worked on the city and both researchers were present in all interviews. Since this study has a deductive approach to test the available theories, the internal validity is not applicable. On the subject of external validity, this research follows Yin's idea where needed.

4. Case studies

Four cities are selected to be looked into as the case studies which include Gothenburg, Hamburg, London and Lyon. In this chapter the data gathered for each case city is presented and the major freight related nodes and transport links are mapped.

To map the cities, first the study boundary for each city is chosen. For Gothenburg, London and Lyon as it is defined in administrative levels, the greater area is used in this study in contrast with the inner city and metropolitan area. In case of Hamburg however, since it is one of three city states in Germany with both local and land (state) authorities the city borders are used as the study boundary.

In the next level it is tried to identify the fright transport gateways including airports, seaports and rail terminals as well as their in/out capacities. Then the major transport networks used by freight and wherever possible their flow are mapped. To identify the main freight generating nodes as it is explained in section 2.4 the cities' land use maps are used. The land use maps for different cities were not completely similar though. For example while the land use map of Gothenburg shows the current activity pattern of the city, in case of London and Hamburg the future projects and changes are more emphasized and both current and future projects are presented for Lyon. To complete the whole picture, the map of the main freight transport networks within and around the city is presented as the representative of major flows within urban area.

In attempt to recognize the major changes of the freight flows for each city it is tried to identify significant changes in types of nodes either from other uses to freight related or vice versa. This information mainly gathered through city planning reports, official city websites as well as interviews.

To understand how freight transport is treated by city authorities first it is tried to find out the decision making process in this regard by investigating the city governance structure and levels. Then to study the position of freight transport in city planning, two main criteria are investigated. First number of people directly involved with freight planning and then how this issue is addressed in city plans and policies.

In the following sections the case cities are presented in alphabetic order. In each city first a general background of the city and its characteristics is presented, and then the freight transport within the city area is reviewed in particular. This part is followed with the study of land use planning process and position of freight related issues in decision making. Finally some redevelopment/renewal projects within the city are introduced as examples for further illustration.

4.1. Gothenburg

Greater Gothenburg is a municipality in Västragötaland county located in the west coast of Sweden (Map XL, 2008). It is the second largest city in Sweden (Göteborgs Stad, 2011) and an important gateway to the Western Europe (European Commission, 2004). Since 1st January 2011, Gothenburg is divided into 10 districts and each district is divided into several smaller areas referred to as primary fields (Göteborgs Stad). These primary fields are shown in Figure 4-1.

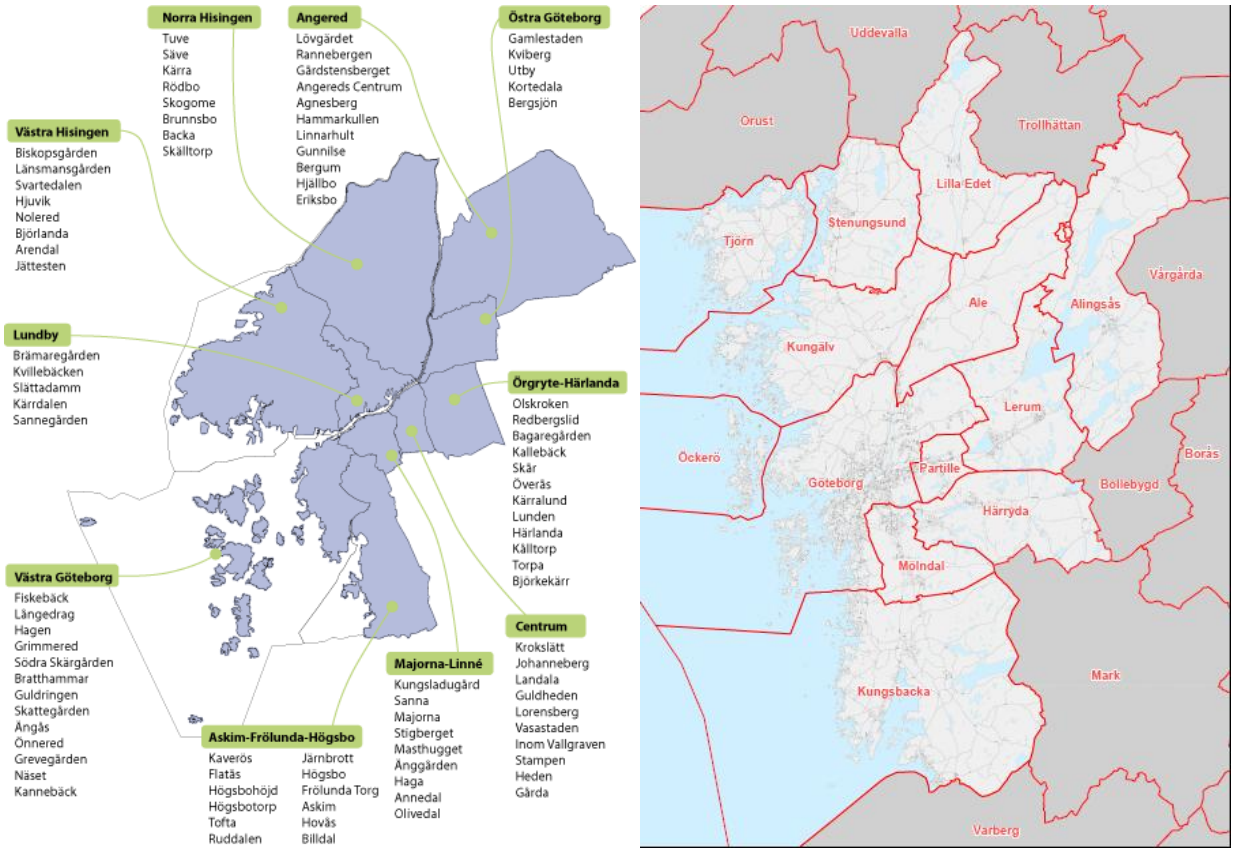

Figure 4-1 Gothenburg regions and neighborhoods (Göteborgs Stad)

The city was founded in 1621 by Gustav II Adolf in a strategic position in the area around the mouth of *Göta Älv* which has been an important trading center since 12th century. (Göteborgs Stad) In 18th century, the Swedish East India Company started trading with east. In the 19th Gothenburg got industrialized (Göteborg & Co) and the appearance of the city changed to a large extent (Göteborgs Stad).

Business clusters of the area include automotive, biomedicine, business and environment, food industry, infrastructure and logistics, design and market communication, ICT and finance (Business Region Göteborg AB, 2011). Table 4.1 presents a summary of demographic and geographic status of Gothenburg.

Table 4.1 Demographic and economic facts for Gothenburg

boundary	Area Km^2	Population (2006)	Population growth	GDP per capita € (2004)	Unemployment Rate (2001)
Greater Gothenburg	450[1]	515,129[1]	2.29%[2]	41,890[3]	8%[3]

1. (Göteborgs Stad, 2011)
2. (Brinkhoff, 2008)
3. (European Commission, 2004)

4.1.1. Current freight transport situation

Gothenburg area is the largest port in Scandinavia and the gateway to the Nordic and Baltic countries. The aim of the establishment of activities in Gothenburg is to serve this entire region. By proximity to Malmö, Copenhagen and Oslo, the Gothenburg area plays the role of the Scandinavian hub. The port of Gothenburg, Göteborg City airport and Landvetter airport offer logistical advantageous and it is easy to travel by car, air and rail. (Business Region Göteborg AB, 2011)

Road

Heavy-vehicle traffic accounts for 7-15% of the total traffic on current roads in Gothenburg. Major roads and the number of heavy vehicles on them are shown in Table 4.2 and Figure 4-2. (WSP Analys & Strategi, 2009)

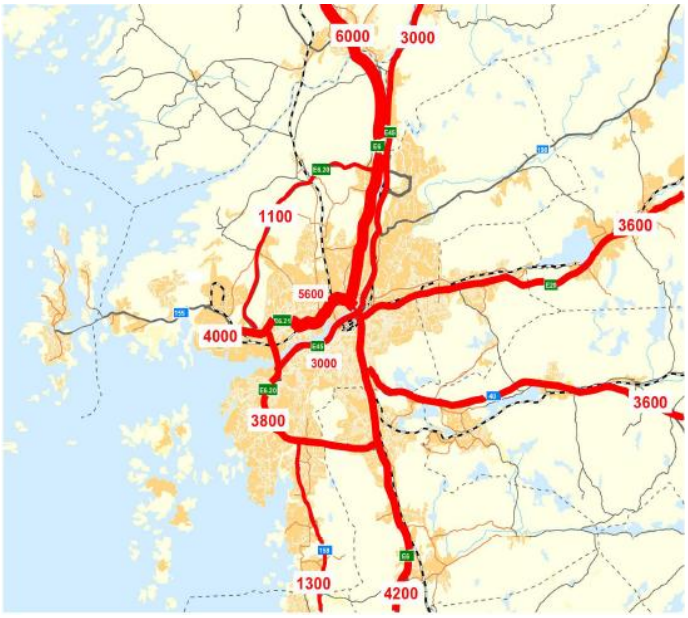

Figure 4-2 Heavy traffic in total, trucks per weekday (WSP Analys & Strategi, 2009)

Table 4.2 Heavy traffic in major roads of Gothenburg per day

155	E6 N	E6 S	E20	E45	Way 40
4000	6000	4200	3600	3000	3600
(WSP Analys & Strategi, 2009)					

As it can be seen, the proportion of heavy traffic decreases the closer they get to the town. The major part of this traffic is transit traffic which is largely connected to the port of Gothenburg. (WSP Analys & Strategi, 2009)

Growth of truck traffic on roads is approximately 5% per year. The plan of the city shows that a number of roads should be built in order to increase the capacity of the current road network and to facilitate

the accessibility to the Port. Some examples are river crossing over the Göta River and roads through the Backaplan area (Stadsbyggnadskontoret, 2009)

Gothenburg multimodal terminal is located in Gullbergsvass in Gothenburg close to Central Station and Post terminal. It is connected to national rail network, has access to the Port of Gothenburg and is adjacent to main roads of E45, E6 and E20. The concept of the terminal is to act as a part of the logistics chain and contribute to an efficient freight transport (JERNHUSEN AB, 2010). The terminal in Gullbergsvass is to be moved to free room for new urban development (Stadsbyggnadskontoret, 2009). The new location has not been decided yet but one candidate is Sävenäs which is located 7 kilometer from the city center. (The city council, 2009)

Rail

Rail transport is becoming increasingly important and it is tried to extend the access of industries to the rail lines. (Stadsbyggnadskontoret, 2009) Bohus line of Göta River has the greatest number of freight trains which is about 80 per weekday. The other major rail terminal is at Kruthusgatan in the center of the town. 70,000 units yearly are handled at this terminal in addition to 30,000 units which are handled at the Port terminal. (WSP Analys & Strategi, 2009) The number of trains per day is shown in Figure 4-3. The rail ways in the Port area are most frequently used lines in Gothenburg and still, the goal is to transport half of the additional freights of the port by rail in future. Expansion projects are planned to achieve this goal (Stadsbyggnadskontoret, 2009). New industrial sites should come close to railways for future extensions.

Figure 4-3 Number of trains per day in Gothenburg (WSP Analys & Strategi, 2009)

Waterborne

Waterborne transport in Gothenburg can be divided into two parts. First is Göta River with approximately 7-8 cargo ships per day. The other one is the Port of Gothenburg which has a transit cargo of about 5,000 to 10,000 tons on boats. (WSP Analys & Strategi, 2009) The port of Gothenburg plays an important role as a logistics center (Stadsbyggnadskontoret, 2009). It is the largest port in Scandinavian region with a significant geographical location since it is within the reach of import/export companies in all Scandinavia and the Baltic region. 25% of all Swedish foreign trade and 65% of all container traffic passes through this port. (Port of Gothenburg)

There are 26 rail shuttles with daily departures which connect companies in the region directly to the port and the usage of electrified port railway has led to more environmental friendly transportation (Port of Gothenburg). 233,000 TEU were shipped through the port during the first quarter of 2011 which shows a 6% increase in comparison to the last year and almost 45% of the containers to/from the port were handled by rail which had an 8% increment. Ro-Ro traffic was up to 10% and 64,000 cars were shipped via the port during this period which shows 39% grow. (Tradeway LTD, 2011)

The future development map of the port can be seen in Figure 4-4 (Port of Gothenburg). The aim is to strengthen the position of Gothenburg and the Port as Scandinavian's logistics center and new sites for logistics companies are required. Several sites are reserved mainly on Hisingen for this purpose. The numbers on the map illustrate the following areas: 1. new goods terminal, 2. new logistics centers, 3. New port entrance, 4. Cargo garage, 5. New container handling, 6. Extension of RORO terminal, 7. New RORO terminal, 8. New railway and 9. Existing logistics centers. (The city council, 2009)

Figure 4-4 Vision of the future of the Port of Gothenburg (Port of Gothenburg)

Air

Göteborg Landvetter airport, located approximately 20 km to the east of central Gothenburg (TravelSmart Ltd) is western Sweden international airport and the second largest airport of Sweden with almost 50 destinations and 1 hangar (Göteborg Landvetter Airport, 2011). 49,280 tonnes of cargo was transported to/from the Landvetter airport in 2008. Freight traffic to and from the airport is almost 50 cars per day. (WSP Analys & Strategi, 2009) Landvetter airport has made large investments for expanding cargo facilities in 2007. It had 12 intercontinental cargo frequencies per week during 2007 and it was expected to be able to handle doubled of this amount due to the related investments. (Göteborg Landvetter Airport, 2011)

Other freight related nodes

In the Gothenburg Master Plan, the area around the North Trail and E6 north is illustrated as logistics areas. The large industrial and logistics areas which are shown in Figure 4-5 are to be preserved for this purpose and should not be freed for regeneration activities. Also the good access to this area should be secured. (Stadsbyggnadskontoret, 2009)

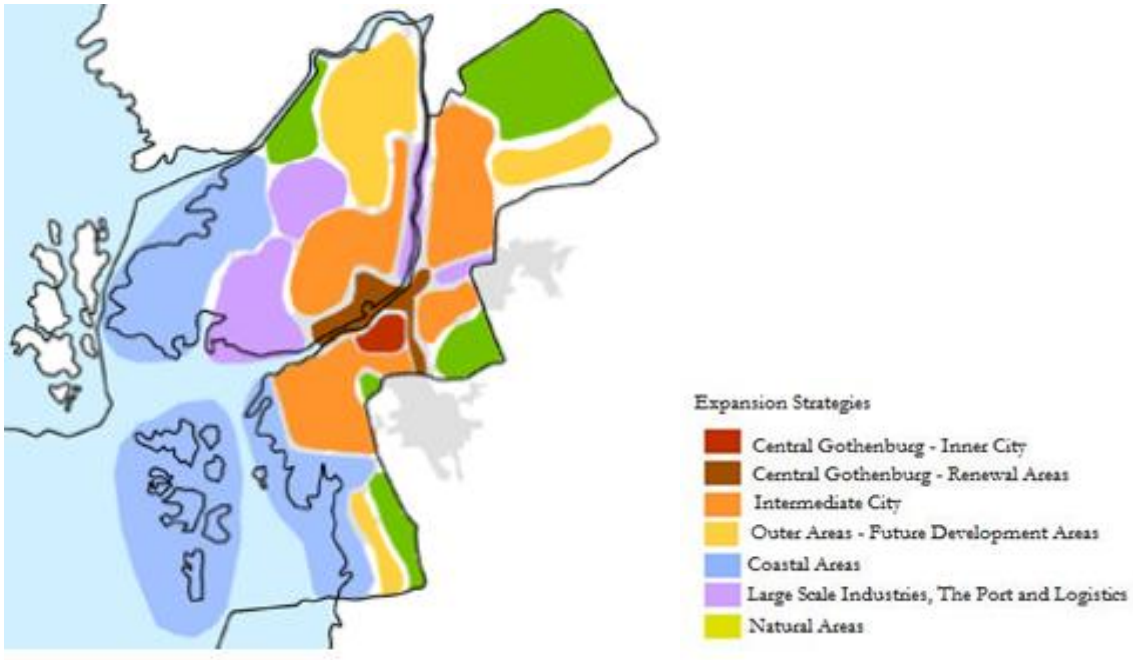

Figure 4-5 Different types of land in Gothenburg (Stadsbyggnadskontoret, 2009)

The Current location of different types of workplaces can be seen in Figure 4-6 (Stadsbyggnadskontoret, 2009)

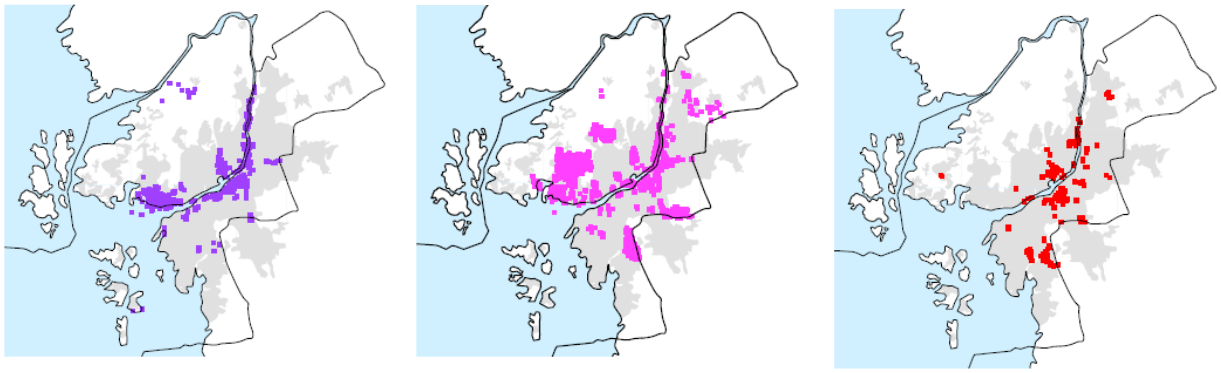

Figure 4-6 The location of Transport and warehouses, Industries and retail centers (Stadsbyggnadskontoret, 2009)

4.1.2. City planning

In the following part, the position of freight transport in city planning and decision making process regarding land-use and renewal/regeneration projects in Gothenburg is discussed.

Governance

Beneath the National level and in regional level (Swedish Government Offices, 2009), Gothenburg is part of the Västra Götaland County. The Gothenburg Region is a federation of 13 municipalities (Gothenburg Region) and the municipality of Gothenburg is divided into 10 districts (Göteborgs Stad).

The major areas of responsibility for county council consist of health and medical service, education and culture. Public transport responsibility is often divided between county councils and municipalities. Västra Götaland County however is one of the three regions which are offered more responsibilities for regional development. (Swedish Government Offices, 2009) This region also is involved in the development and activities in culture, environment, research, business, infrastructure, communication and international cooperation. (Vgregion, 2010)

The Gothenburg region - which consists of 13 municipalities – has a mission to improve cooperation between these municipalities and to provide a forum for exchange of information and experience among them (Gothenburg Region). At the local level, municipal councils are responsible for education, care of the elderly, roads, water and sewage, energy, etc (Swedish Government Offices, 2009). Gothenburg city council decides on environmental issues, major investments and city planning (Göteborgs Stad).

Regarding the ownership of lands, there are no direct rules to force logistics facilities and warehouses to move and it is more based on mutual agreement (Hagson, 2011). However, it is possible for public sector to buy a land from private companies or individual owners if this sector does not agree about the activities which is done on the land. Also there is an option for public sector to buy a land from the private owners with a suitable price if they decide about having a logistics facility in an area. (Berger, 2011) For changing of green areas to industrial lands, private sector needs to get permission and it is not

difficult especially if these areas are along the highways and big roads. Each of the 13 municipalities in the region decides based on their own benefits since they want to create more jobs and attract more people to live in that area and pay tax. However, Västra Götaland region aim, which works based on free will and mutual cooperation, is to increase cooperation between these areas (Hagson, 2011).

Land-use planning

The Gothenburg Comprehensive plan which focuses on strategic issues, is in line with the regional strategy. This strategy emphasizes the need for strong development at the core of the region and on major investments in infrastructures. 30,000 new homes should be built by 2020 in the central renewal areas if the freight terminals of the city can be relocated and infrastructure is improved. The aim of the Gothenburg plan is to create an attractive city environment which "can be distinguished by the complex mix of uses". (The city council, 2009, p. 5)

Gothenburg continues to develop in a sustainable manner in a way to increase densities and strengthen the region. "Complementary development combined with development at strategic nodes make effective use of limited land resources" and it is tried to build in existing built up areas. (The city council, 2009, p. 8)

Position of freight transport

In Gothenburg, freight transportation has come into consideration since 2002 (Lindholm, Gothenburg, 2011). There are few people who are working on freight transport within the city authorization and in connection with city planning. There is just one person who is working directly with freight transport in Traffic and Public Transportation Authority; however, the focus is mainly on traffic engineering rather than the city planning (Hagson, 2011). In addition, the budget assigned for freight transport is not known. There is no freight plan for the city. However in the first part of the city plan, there are some parts which mention freight transportation with a focus on multimodal transportation and terminals. (Stadsbyggnadskontoret, 2009)

There is no rule for involving freight transport in renewal/regeneration projects and the activities on this area are more partnership and negotiation and based on mutual benefits. (Widegren, 2011) (Jäderberg, 2011) The city of Gothenburg has started a Local Freight Network since 2006 to discuss city distribution with different stakeholders such as transport suppliers, property owners and retailers (CIVITAS). *Sustainable Urban Transport (SUT)* is a new project in time frame of 2009-2012. The focus of this project is on passenger and urban freight distribution and different aspects of city planning, logistics and new technology regarding vehicles are considered through the cooperation between different parties including Chalmers University, Volvo Technology and Gothenburg traffic office. (SUT, 2010)

Projects

Greater Gothenburg has implemented lots of renewal/regeneration projects in its territory. Below two projects are mentioned as examples for further illustrations and to be used in city analysis.

- ***The river bank Project***

The river bank or *From Riverside to Rivercity* is a project started in 1970 when three shipyard and four port areas on Göta Älv river north shore were freed for other uses in the center of Gothenburg. The area covers Ringön, Frihamnen, Backaplan, parts of Gullbergsvass and also the south bank. The new city in the old industrial area covers 250 hectares of land and 40 hectares of water focuses on creating easy access for all modes and space for regional activities, workplaces, commerce and service centers, houses and parks. The early idea in 1975 was to restore employment in this area by setting up industrial production in shipping and energy sector. However when the overall plans for the area came up, it also covered housing, education centers, etc. (City Planning of Göteborg, Älvstranden Utveckling AB, 2010)

The port of Gothenburg now is quite out of the city and the riverside is changing to more livable place. But it might be needed for the port to go even further since the ships are getting bigger and more space for containers will be needed. (Hagson, 2011)

- ***West Swedish Package***

In summer/autumn of 2009, the discussions about the western Swedish infrastructure package started. This project includes investments in public transport, railways and roads with an investment of 34 billion SEK. In this project Western link is planned which is a railway tunnel with stations in central Gothenburg. Figure 4-7 and Figure 4-8 show the Western link and the Marieholm tunnel which is planned to go under the Göta River and connects to Partihall link which is going to connect E20, E45 and E6 in the area Olskroken-Gamlestaden. (Västra Götaland Region, 2011)

Figure 4-7 Western Link (VästraGötalandsRegionen, 2010)

Figure 4-8 Marieholm tunnel and other River connections (VästraGötalandsRegionen, 2010)

The West Swedish Package time horizon covers 2010-2021 and has two schemes in connection with the infrastructure planning. The national plan includes the infrastructure investments regarding all modes all over Sweden and the regional plan includes the development of the regional road network. It means that the content of the project is decided by municipalities with instructions from the government. Västra Götaland Region, Gothenburg City, Gothenburg Region, Halland County Council, Västtrafik and Traffic and Public Transportation Authority are different parties working together in this project. (Västra Götaland Region, 2011)

4.2. Hamburg

Hamburg, the port city located at the river Elbe, is the second largest city of Germany and the second largest port in Europe. The city economy historically was developed in close connection with the port related industries. However during the nineties the global economical changes as well as high pressure on the port sector competition has resulted in change of industries toward media and communication technology. (Grossmann, 2006) Figure 4-9 and Table 4.3 present some demographic and economic characteristics of Hamburg.

Table 4.3 Demographic and economic facts for Hamburg

Boundary	Area km^2	Population (2005)	Projected Population (2025)	Unemployment Rate (2004)	GDP per capita € (2004)
Free and Hanseatic City of Hamburg	775[1]	1,743,627[1]	1,745,480[1]	11%[2]	45,246[2]

1- (Statistical Office of Hamburg and Schleswig-Holstein, 2011)
2- (Urban Audit)

Figure 4-9 Hamburg's location in Germany

4.2.1. Current freight transport situation

As a global hub for overseas, central and eastern Europe and the entire Baltic Sea region, Hamburg benefits from its central position at the heart of Europe's logistical commodity flows (Logistic Initiative Hamburg)

Road

Hamburg is the most important distribution centre for North Eastern Europe. A network of circle trunk roads connects the city to the highway system. There are 80 km of highways within the city boundaries. Hamburg is linked to international and regional centers through A7 to the west, A1 to the south and A24 to the east (Flughafen Hamburg GmbH). The quantity of road freight transport to/from/within Hamburg is not found.

Rail

About 90% of freight transported by rail in Hamburg is associated with the port. Port of Hamburg is the source or destination of about half of all containers transported by rail in Germany. Today the yearly rail freight expansion of the port is about 1.5 million TEUs which are expected to increase to around 4.5 million TEUs in 2015 (Behörde für Stadtentwicklung und Umwelt, 2007). The railway network of the Port of Hamburg connects the terminals to railways in Germany and the entire Europe.

Waterborne

Port of Hamburg is one of the most important transshipment centers for rail containers in Europe thanks to its three major port railway stations and 375 kilometers of track (Flughafen Hamburg GmbH). In 2009, totally 110.6 million tons of cargo was handled in the Port of Hamburg. A large amount of goods which

are produced or consumed in the Hamburg metropolitan region are transshipped through Port of Hamburg. Figure 4-10 illustrates different links from the entire Europe to the Port of Hamburg. The long distance road routes are not presented.

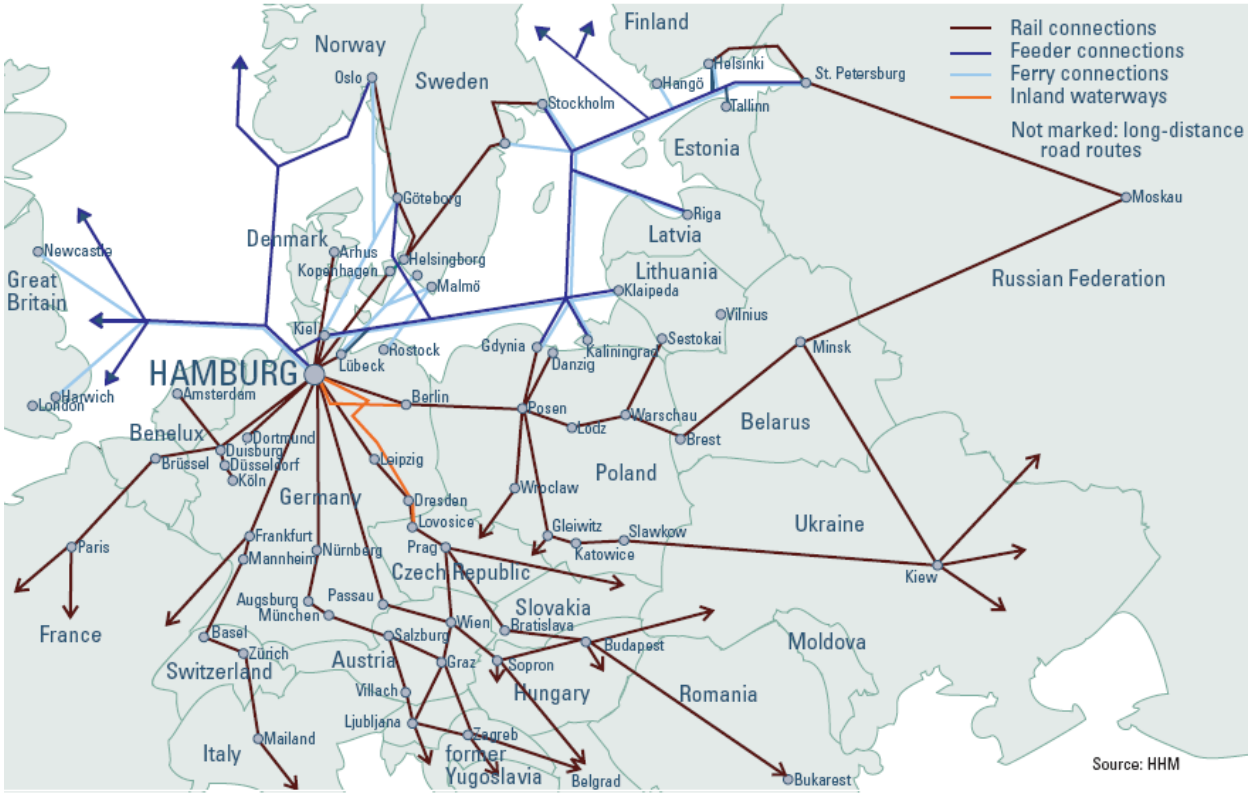

Figure 4-10 Links to the Port of Hamburg (Gotthardt, 2005)

Hamburg Port Authority (HPA) was established in 2005 in order to combine the Hamburg's port-related services and to introduce a single contact for all inquires in different areas such as infrastructure, safety, property management etc.

Air

Hamburg Airport is Northern Germany's leading airport in the air cargo segment. In 2009 in Hamburg Airport 31,464 tons of cargo was handled (excluding transit and post). Hamburg's air cargo companies have expertise in express cargo, such as spare parts, and also in the transhipment of consumer electronics, textiles, pharmaceutical and chemical products.

Figure 4-11 presents the freight infrastructure around the city and how it is connected to the other international and regional nodes.

Figure 4-11 Hamburg freight transport infrastructure (Flughafen Hamburg GmbH)

Other freight related nodes

Turnover of industrial real estate in Germany during year 2010 shows that Hamburg by far is the most attractive location in Germany for logistics' lands. Demand forecast expects the need for 355 hectares of logistics land within Hamburg boundaries till 2025 out of which provision of 170 hectares till 2015 is planned. Strategies to realize this goal includes allocation of both new logistics lands as well as redevelopment of grown industrial areas. Figure 4-12 shows the new logistic areas within Hamburg. Two of the offered locations in development strategies are withdrawn by politicians. Environmental impacts were the main reason for the withdrawal of north-eastern site. In the southern area (Heimfeld) damaging the green landscape and negative traffic effects were the main concerns. (Neumann, 2011)

One of the redevelopment sites is Billbrook with high demand for industrial land. This area offers about 600 hectares of industrial land with excellent transport connection and centric location. The main strategies within this area are to increase density and redevelop the available industrial lands. (Neumann, 2011)

The main problems facing the development of logistics lands in Hamburg includes urban development guidelines, Landscape and nature protection, Traffic effects, Noise, Land consumption, Effects on townscape, Competition to house building and finally Employment rate below average. (Neumann, 2011)

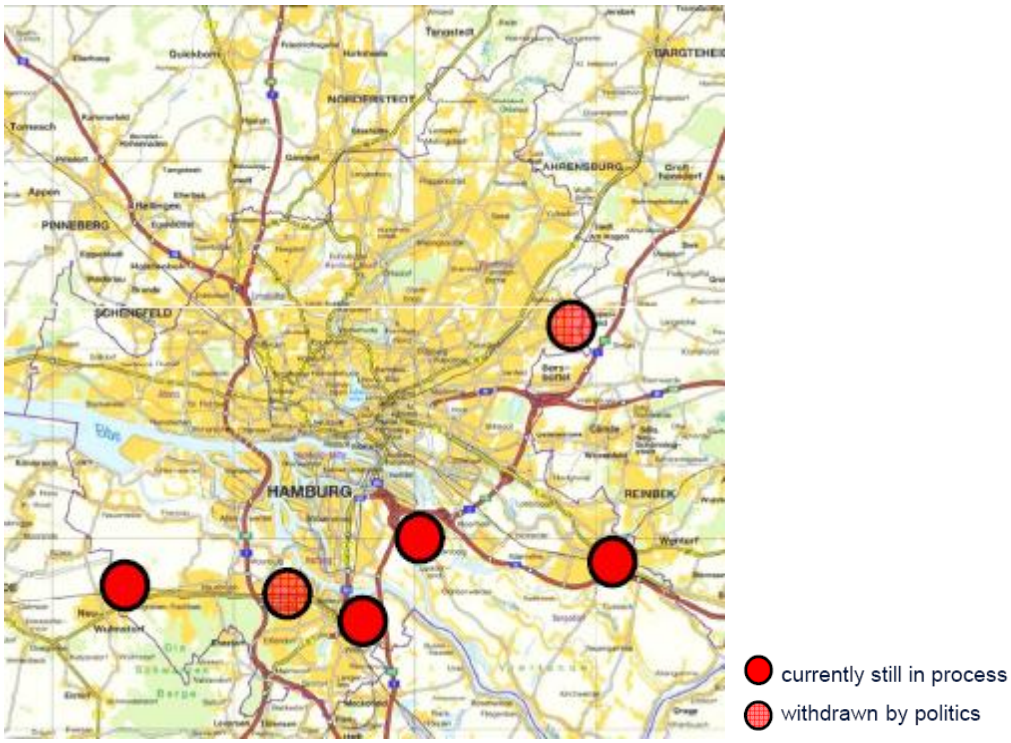

Figure 4-12 New logistic areas in Hamburg (Neumann, 2011)

4.2.2. City planning

In the following sections the process of decision making and the involved bodies in city planning in Hamburg are introduced and the position of freight transport is reviewed. Further on some projects of regeneration within the area are presented for further illustrations.

Governance

The administrative sector in Federal Republic of Germany is organized in three levels: federal, land (state) and local. There are 16 lands in Germany, 13 of which are territorial lands and the rest are city states. Hamburg along with Berlin and Bremen are the Germany city states which are both land and local authority. Local authorities are divided into two levels: municipalities and the counties. Lands are responsible for execution of laws made by federal government. Land-use planning and construction of buildings and roads is under responsibility of local authorities. Municipalities or counties are independently responsible for waste and sewage disposal. However responsibilities within the area of transport sectors (road in particular) is shared across all levels of government. (OECD, 1997)

In 2006, the administration organization of Hamburg went through a reform based on which the districts of Hamburg are not only responsible to authorize the building constructions but also to combine the land-use plans. (Bauen + Wirtschaft, 2008)

Land-use planning

Hamburg Ministry of Urban Development and Environment is responsible for the state and regional planning of Hamburg, city landscape planning and especially those involved with the project "The leap across river Elbe" (See page 43). In 2007 this ministry introduced "the Spatial Vision of Hamburg as a draft" to present the scope of urban development in Hamburg till 2020. The vision is written based on five main targets which are identified as the most important topics to be focused and discussed: (Hamburg Ministry of Urban Development and Environment, 2007)

- More city in the city
- Building on qualities: a home in family-friendly Hamburg
- Using expertise – boosting the region's economy
- The Hamburg City Experience
- The metropolis is city and region

One of the reasons for introducing a new concept in urban development was the changes Hamburg had gone through during previous years. Some instances are release of some areas belonged to Federal Forced Army, the Post and the German Rail to be changed to other forms of urban uses. Among all, the most considerable change belongs to the former port area. Release of the land in this area led to the project "Leap across the river Elbe" and as a part of that "Hafencity"- the biggest ongoing urban development project in Europe. (Bauen + Wirtschaft, 2008) These types of changes are the subject of the *More city in the city* as it focuses on reuse of land inside the city area in more efficient way. (Hamburg Ministry of Urban Development and Environment, 2007)

The Spatial Vision focuses on industries as the driving force of the city's economy. *Using expertise-boosting the region's economy* tries to bring the land demanding but high competence industries such as port, logistics and aviation to the focus. This part not only refers to the amount of land but also the location. One target in this part is to provide 35-45 ha of commercial land each year. 25 hectares logistics land in Obergeorgswerder area is another target to meet. In addition, the Spatial Vision emphasizes on using the technical infrastructure to fulfill the port logistics requirements which calls for development of rail and road networks. (Bauen + Wirtschaft, 2008)

Position of freight transport

In the federal level in the document "Freight Transport and Logistics Master Plan" one sector is dedicated to the freight transport within urban areas. First the challenge of freight transport in current situation is discussed. The main reason why the logistics projects have not been successful in the past is realized to be their short duration and the fact that they have not been compulsory. In case of successful projects, the reason is believed to be consideration of spatial planning when planning logistics nodes. In addition, the separation of passenger and freight transport studies is considered to be unrealistic. (Federal Ministry of Transport, Building and Urban Affairs, 2008)

The master plan outlines the strategies toward "environmentally-friendly and climate-friendly urban transport" among which the following guidelines can be recognized: (Federal Ministry of Transport, Building and Urban Affairs, 2008, p. 42)

- “better account should be taken of the interests of commercial transport in urban planning”
- “better account should be taken of the interests of freight transport and logistics in spatial and sub-regional planning”
- “better link-up between the decision-making and implementation levels”
- “better communication between business practice and planning decisions”

In the local level, in order to expand Hamburg’s role as the leading logistics hub in northern Europe and provide support for all logistics-related industries, trades and services The Logistics Initiative Hamburg was established by representatives of the business community and the Hamburg State Ministry of Economic and Labor Affairs. With more than 450 active members from the logistics industry and related sectors, this powerful network is the largest of its kind in Germany. The Logistics Initiative Hamburg is involved when it comes to projects of industrial character such as the new logistics areas (Figure 4-12) (Neumann, 2011).It is organized around a central Cluster Management at which all data exchanges to create a complete network among corporations and academic and research institutions from the private sector as well as state of Hamburg and its institutions from the public sector (Logistics Initiative Hamburg).

Projects

- ***Leap across the river Elbe***

Elbe is located south of central Hamburg and is the largest river in Europe (52km). The island's characteristics vary greatly from cultural landscapes in the east to the large-scale building programs from the 1970s and new houses, to post-war settlement and large-scale port activities in the west. Since the 1960s Elbe has become home to a multicultural population which has meant a major integration challenge. Maturity, isolation and social problems as a result of segregation have come to give Elbe a negative image in the media and in the minds of many of those living in Hamburg. (Waterfront communities project)

The shape of river Elbe with many arms has given unique characteristics to the city of Hamburg. However it is one of the challenges in front of the city development as it has cut the city in several parts and resulted in high diversity of waterfronts. (Waterfront communities project)

The long term development strategy “Leap across the river Elbe” is aimed at connecting these parted areas through a development corridor: inner city development, redevelopment of the waterfront and connecting Hafen City through the river island Wilhelmsburg to Harburg inner city port on the other side of the Elbe. It is defined based on the concept of Hamburg growing within its boundaries and decreasing the urban sprawl. New urban development mainly takes place in southern part of the city with the focus on the river island of Wilhelmsburg. (Bauen + Wirtschaft, 2008)

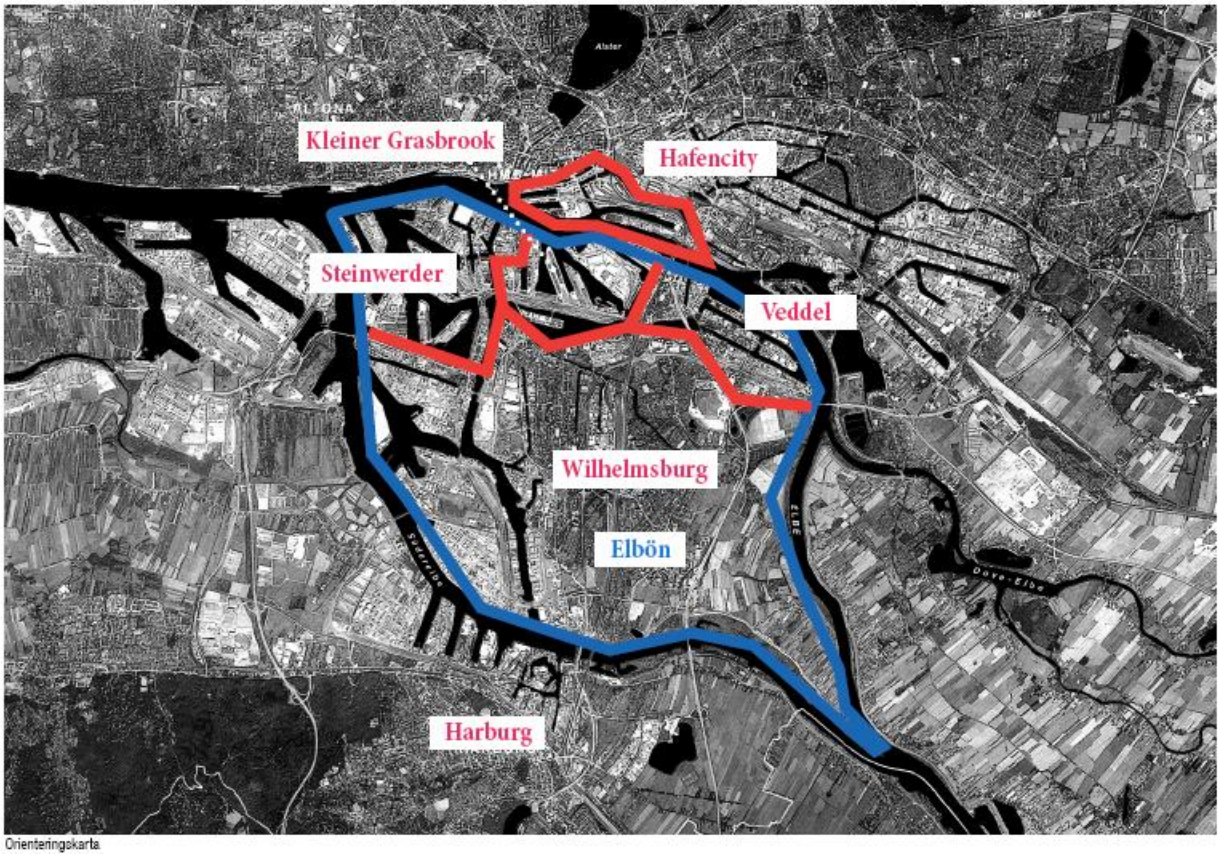

Figure 4-13 The area affected by the projects "Leap Across River Elbe" and the "Hafencity"

- ***Hafencity***

The aim of Hafencity urban development project is to extend and enlarge the Hamburg's city center through transformation of nearby areas where used to be harbor. It is the biggest construction project that city of Hamburg has ever had which will take about 25 years to be completed. It is located between the city center and the river Elbe and covers about 155 hectares of land. It will present a mixed urban structure with the focus on new residential areas, new job opportunities, retail, education and culture. "A primary town planning objective for the future urban structure is to include, as far as possible, a diverse yet physically small-scale mix of uses, from residential to industrial". (Hafencity Hamburg GmbH, 2006, p. 55)

At the moment there are two important road connections between the city centre and Hafencity. So, further main road connections, (both parallel and intersecting) will be absolutely necessary in the long term concerning traffic volumes along these roads. While the traffic situations of these roads are not in the scope of the Master Plan, it is mentioned that for the sake of the project's success it should be considered. This is while the connection of the Hafencity to the urban rail network is very difficult. (Hafencity Hamburg GmbH, 2006)

The Master Plan was prepared based on the results of an international town planning competition, the outcome of a public planning debate, and political decision-making.

4.3. London

London usually refers to the Greater London area which includes city of London and 32 surrounding boroughs and is the center of UK's government. Through its history London has become a city with its network of neighborhoods and town centers. At the moment it is the largest city in European Union and one of the three world financial centers (Greater London Authority, 2008). City of London is the largest business district in Europe with daily population 300,000 people (London Online). At the same time London is one of the most culturally diverse cities in the world with a big heritage of historical buildings and waterways. London also functions as a hub for international connections. Table 4.4 summarizes some demographic and economic facts of London.

Table 4.4 Demographic and economic facts for London

Boundary	Area km^2	Population Million (2006)	Projected Population Million (2031)	Unemployment Rate (2004)	GDP per capita £ (2008)
Greater London	1579[1]	7.6 M[2]	8.9 M[2]	7%[3]	40,432[4]

1- (London Online)
2- (Transport for London, 2010)
3- (Urban Audit)
4- (White, 2010)

4.3.1. Current freight transport situation

Distribution of goods and services has a significant role in London's economy. At the same time increased economic activities as well as a growing population calls for more freight transport and service distribution within London (Greater London Authority, 2008). It is estimated that the need for goods and services will be increased by at least 12% between 2006 and 2026 and logistics sector is responsible to move the goods and deliver services (Greater London Authority, 2007a). In the following sections the characteristics of two main elements of logistics sector –transport network and freight related nodes- within London are introduced.

Road

London is a "net importer" meaning that tonnage of freight loaded in London is less than tonnage unloaded. If only road freight is considered, London is one of the "significant net importers" among all regions in Britain (Transport for London, 2010, p. 34).

According to London freight data, in 2007, more than 89% of freight lifted in journeys to, from and within London belonged to road transport. Road transport not only dominates the share of transportation modes in term of lifted tonnage but also is ahead of others in available freight data (Transport for London, 2010).

In term of freight vehicles kilometers travelled, light goods vehicles (up to 3.5 tonnes gross weight) has the biggest share with 81% of total while its growth is very similar to London's gross value added as it is shown in Figure 4-14. However the growth of vehicles kilometers travelled by heavy goods vehicles (both rigid and articulated vehicles above 3.5 tonnes weight) has been quite constant between 1993 and 2007.

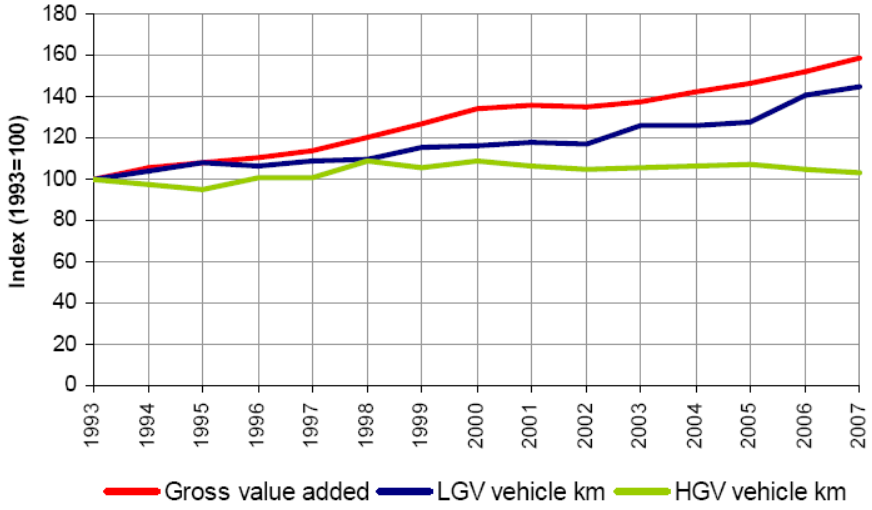

Figure 4-14 Gross Value Added and goods vehicles kilometers travelled in London (Transport for London, 2010, p. 35)

Figure 4-15 presents the most strategic freight routes of London based on the average daily flows in London road network. The map also includes information about the international and metropolitan centers, wholesale markets, rail freight terminals, airports as well as wharves in operation.

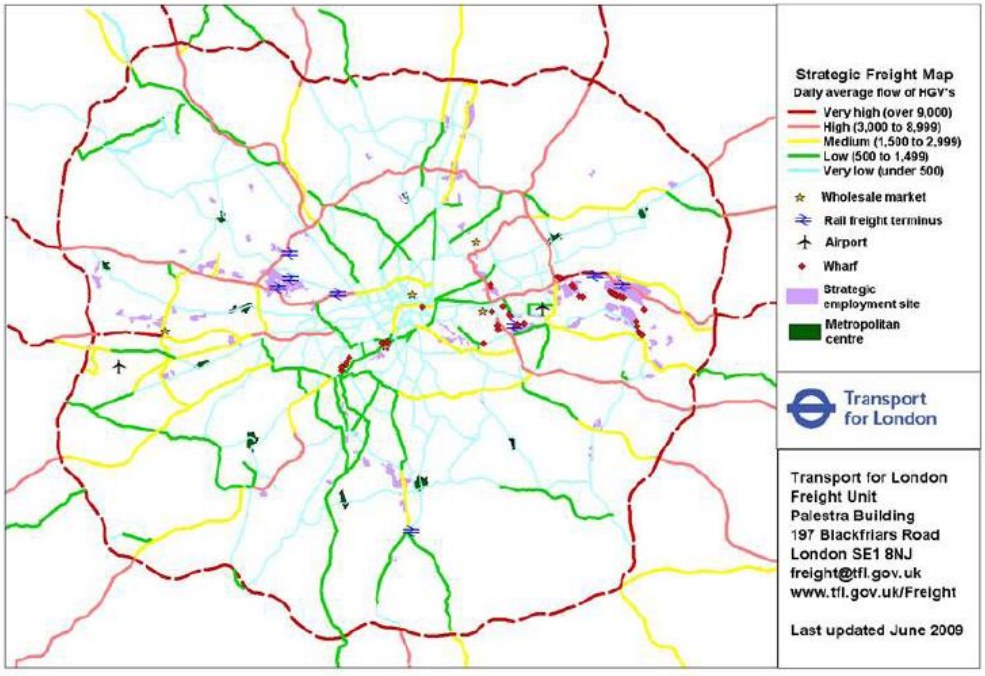

Figure 4-15 Strategic freight routes of London (Transport for London, 2010, p. 66)

Rail

In 2007, London rail freight has been above 6 million tonnes, 70% of which belonged to journeys to London and only 11% within London area. In 2008, 29 rail terminals were active in London but the number of trains passing each terminal is considerably different and may change in different situations. For example a big construction project such as Olympics site affected the volume of material operated in Bow East terminal. (Transport for London, 2010). Figure 4-16 illustrates the rail freight network of London and the adjacent facilities.

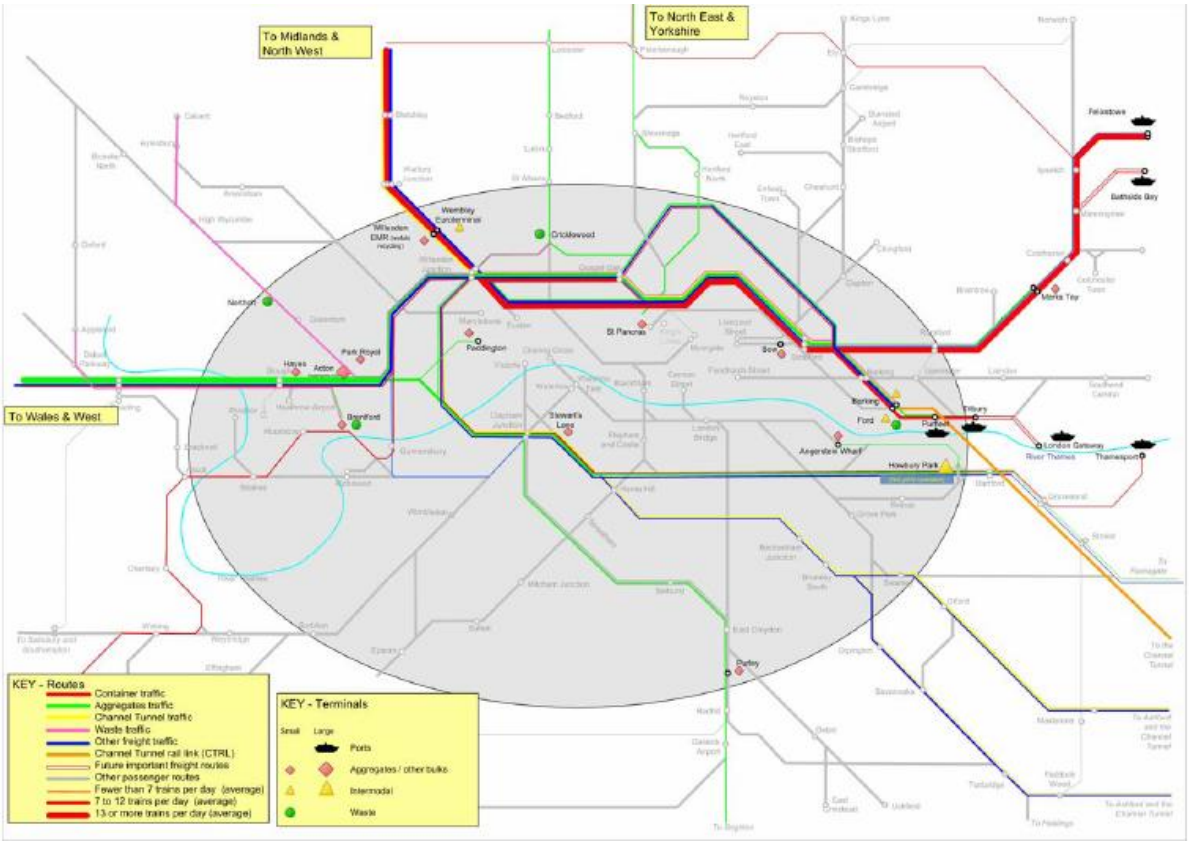

Figure 4-16 London rail freight network and main facilities (Transport for London, 2010, p. 76)

Waterborne

Port of London authority (PLA) is responsible to promote the use of Thames. In 2007, PLA was the second port of UK in term of handled quantity among which 84% arrived to and 16% departed from the port. The share of freight associated with wharves inside London handled by PLA has declined from 25% in 1995 to 16% in 2007. Of this volume only 15% moved between wharves inside London. (Transport for London, 2010)

In 2007, about 200,000 tonns of freight was transported within London using London canals. Handled freight consists of sand and gravel, waste and construction materials. The King's Cross contract in 2007 was an illustration of barges capabilities in transport of construction materials. Development works for Olympic zone were also expected to bring considerable freight flows to London canals in that area. The potential is estimated up to 1.75 million tonnes of construction materials. (Transport for London, 2010)

Air

In 2007, among all air freight handled in UK's airports, 74% passed through London's airports of Heathrow, Gatwick, Stansted, Southend and Luton. In term of handled freight tonnage, Heathrow by 76% share is ahead of other London's airports. The majority of freight handled in Heathrow, Gatwick and Stansted airports were to or from outside European Union. London's airport were net importer in 2007 with approximately 1.0 million tonnes unloaded and 0.8 million tonnes loaded cargo (Transport for London, 2010)

A big part of goods transportation to or from airports is done by road. This is even the case to transport goods between two different airports within UK. A study in 2000 showed that every year about 200,000 tonnes of air freight was moved by road between Heathrow airport and other UK airports. (Transport for London, 2008)

Other freight related nodes

According to the definition of Greater London Authority (2007b) industrial land use within London includes General industry, Warehousing, Waste, Utilities, Public transport functions and Wholesale markets. However demand for the land in the future is different between all these subcategories . The main reason is structural changes in London's economy and transformation from manufacturing toward service providing. This shift has changed the nature of emlpoyment within London and released significant amount of industrial lands to be used for other purposes. On the other hand reduction in manuafcturing has resulted in increased outsourcing which calls for more warehousing and logistics lands (Greater London Authority, 2007b). In addition London Plan asks for increase of waste managemnt facilities within London which calls again for more land (Greater London Authority, 2008). Figure 4-17 presents release and demand of industrial land in different subcategories till 2026.

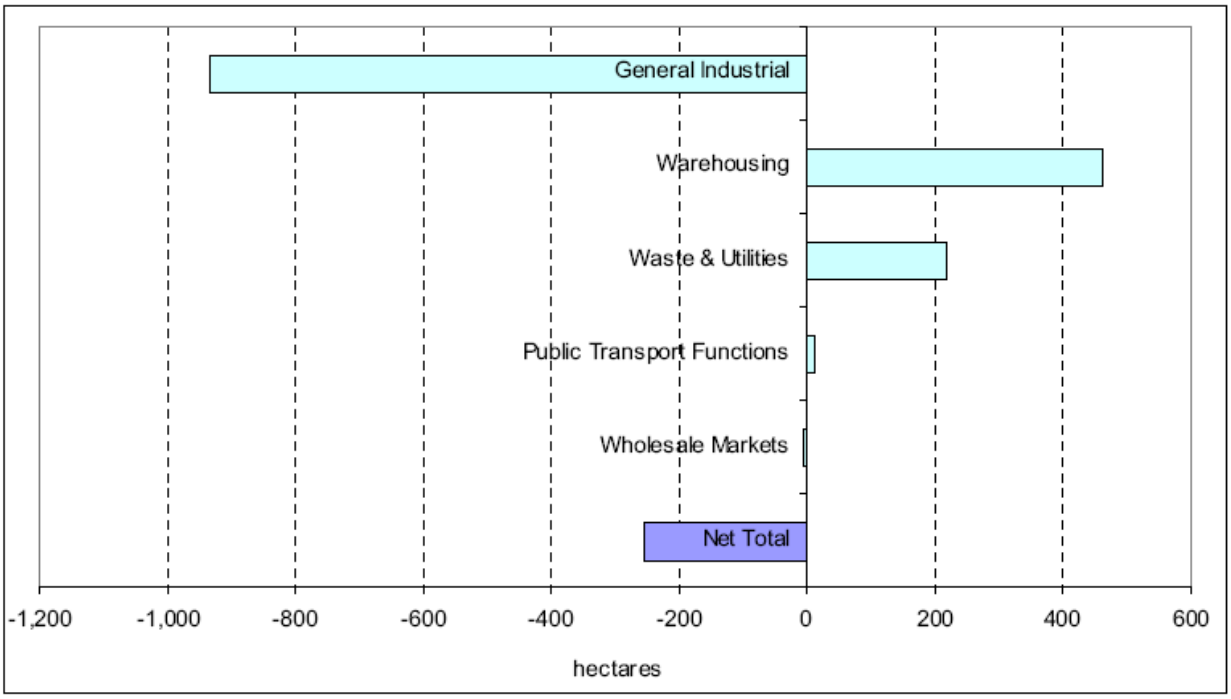

Figure 4-17 Release and demand of industrial land in Greater London (Greater London Authority, 2007b, p. iv)

In 2006 London had about 1.6 million m^2 of warehousing space which was about 11% of total warehousing space in England. Beside that a big part of warehousing spaces in south east of England (about 18.h million m^2) had been used to transport freight to or from London (Transport for London, 2008).

The logistic property market has been divided into six geographical categories within London as it is shown in Figure 4-18.

- Central Service Circle
- The Thames Gateway
- The Lea Valley
- Park Royal/A40/M4/A4
- Heathrow and
- Wandle Valley

Studies show that the official boundaries of London has no decisive effect on demand of land in these areas and demand changes based on other reasons such as access to the strategic routes. Among all areas, Heathrow and Park Royal stand for the highest demand of warehousing land. However increase of land value and rents shows the growing demand in other areas such as Thames Gateway and Lea Valley as well (Greater London Authority, 2007a). The demand transfer from Central Service Circle to other areas is probable while the price issues make the opposite direction unlikely. Due to the land value in Heathrow and Lea Valley it is not likely that demand from other areas move toward these parts. Supply chain issues however may affect the transfer of land demand between other areas. For example while

supply requirements of food industry demand the closer warehousing areas, prices push organizations to further distance from central areas (Greater London Authority, 2007a).

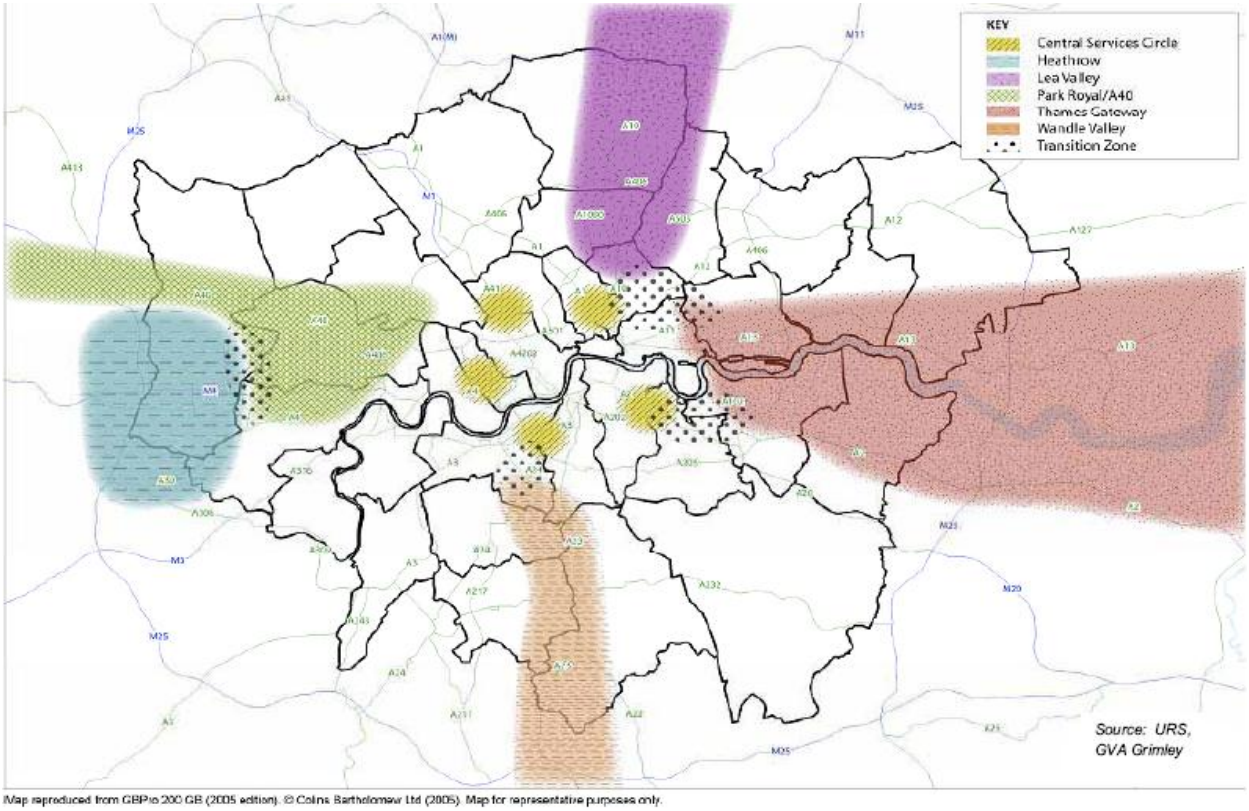

Figure 4-18 Main logistics property market areas in London (Greater London Authority, 2007a, p. 30)

4.3.2. City planning

In the following sections the process of decision making and the bodies involved in Greater London are introduced and the position of freight transport in city planning is reviewed. Further on some projects of regeneration within the area is presented.

Governance

Three levels of administrations are involved in London's governance: National, pan-London and Borough. Central government is connected to other governing agencies in London through the Government Office for London (GOL). Greater London Authority (GLA) is governing London at the pan-London level. GLA consists of two distinct parts: the Mayor and the Assembly. The Mayor's role is executive and determines the overall vision for London. The Mayor's main responsibility is to set strategies in different areas including: Air quality, Spatial development, Culture and tourism, Economical development, Transport and Waste. The Assembly's role on the other hand is to examine and question the Mayor's work as the representative of Londoners. Greater London consists of 33 boroughs one of

which is City of London. Each borough is managed by a council and councils are responsible to deliver the Mayor's strategies in the local level as well as public services such as waste collection, schools etc. (Greater London Authority). The Mayor's long-term visions and strategies concerning land use management within Greater London are reflected in a document named Spatial Development Strategies for London or London Plan (Greater London Authority).

Land use is controlled by public sector to some extent but the market forces are the main drivers of site accumulation for redevelopment projects. Beyond that the cooperation between public and private is voluntary. However, where benefits of logistics location are extended to the greater London, there are some supplementary documents to protect the public interest. For example there is one for wharves protection although wharves are mainly owned by private. It is intended to protect the logistics capabilities of the river and to protect the land use near each wharf to enable the required operation. These sorts of documents are trying to protect these facilities for the future of London. In addition local authorities use compulsory purchasing orders (CPO) to buy land despite of the owner's interest. There are of course regulations for use of that tool to get the land (Steele, 2011).

In order to put the Mayor's strategy for transport into operation Transport for London (TfL) has been established in 2000 to be responsible for management of transport across the Greater London (Transport for London). Freight unit within TfL is responsible for London freight matters and receives the national guidance from department of transport for consideration of freight in development projects (Steele, 2011).

Position of freight transport

In London-pan level 10 full time employees are working directly with freight issues. This is beside those are dealing with freight matters as a part of their duties. However the budget granted to freight by public sector is not considerable and the freight unit attempts to transfer the costs of its programs to the private sector (Steele, 2011).

About one decade ago the freight transport issues was considered in London's development through a document about sustainable urban distribution. That document looked at some sustainability indicators of the freight transport such as efficiency, environmental impacts, etc. and was intended to identify how those indicators should be considered in more local policies. But there has been a significant change within last five years since the freight unit in TfL has managed to bring the importance of freight facilities' locations into consideration. In the current London Plan there are some recommendations about the location of freight facilities to improve the overall efficiency of the spatial performance. This is considered as an achievement because planers tend to see the freight issues to be only transport related and not land use related. So it is a big step to convince the land use planners to include elements related to the location of logistics facilities (Steele, 2011).

Section 3B.4 in the current London Plan, industrial locations, considers the surplus of industrial land within Greater London to be used for alternative uses. It also has recommendations for the location of waste management, logistics and transport facilities, wholesale markets and warehouses to be fit to the purpose and according to the overall need of London (Greater London Authority, 2008).

In section 3.159 it mentiones “Within London, strategic logistics provision should continue to be concentrated on Preferred Industrial Locations, related to the trunk and main road network and to maximize use of rail and water based infrastructure” (Greater London Authority, 2008, p. 113). It is specifically trying to target those locations for logistics and distribution activities (Steele, 2011).

Section 3.160 is about food distribution in particular. London has five wholesales market for food and this section emphasizes an efficient wholesales market function for food delivery. The main intention is to protect the wholesale function within any redevelopment area inside Greater London (Greater London Authority, 2008). In particular there are some issues in one of the markets, New Spitalfields, since there is a big push for redevelopment in that area. Section 3.160 in the spatial development strategy (London Plan) has been pretty influential to have freight issues better considered in this case. There have been lots of surveys and logistics modeling to see the effects of relocating that function and without the London Plan’s support, it was not possible to justify the time and money spent (Steele, 2011).

Projects

- ***Croydon Borough***

One of the current redevelopment projects within the Greater London belongs to the Croydon borough in the south part of London. Age of majority of the area goes back to 1960. There are five master plans within the borough and the freight unit at TfL has been working closely with the planners to make sure that the freight transport and logistics facilities are being actively considered (Steele, 2011).

In the section of “connected city program” of the Croydon’s “Infrastructure Development plan”, efficient freight transport system is considered as a must for the future visions of the area. In addition, while in some specific areas the change of land use from industrial to residential is permitted, the “Core Strategy” document main emphasis is to protect the industrial/warehousing facilities despite of the decline in related economies. That is mainly due to the expected need for land for waste management/recycling in the future (Croydon Council, 2010).

- ***Olympic 2012 site***

The development of the Lower Lea valley for London 2012 Olympic Games is not only seen as a sporting facilities development but also as a an opportunity to regenerate the area to provide housing, offices, schools, health facilities etc. Some of the main objectives of this project are, to increase the efficient use of the urban land, creating an infrastructure platform for future developments, to attract the private investment as well as commercial activities and to improve the environmental quality to make it a place to live and work (Olympic Delivery Authority & London Development Agency, 2007).

However, in such a massive redevelopment and despite of the freight unit efforts, freight issues were not considered in the initiatives. It is believed that to consider the freight transport issues after the event is very late and may not be as effective especially because many logistics premises have

been relocated as the consequence of redevelopment for the games without knowing what the consequences would be later on (Steele, 2011).

4.4. Lyon

The urban community of Lyon, also known as Greater Lyon, is located in the heart of the Rhone-Alps region in South-Eastern France as it can be seen in Figure 4-19 and it is the capital city of the Rhone Department (City of Lyon). It is included of 58 municipalities (communes) and is considered as France's second city in terms of urban area and economic potential (Thematic Committee, 2001). The number of inhabitants in municipalities starts from 1,025 in Curissois communes to 474,946 in Lyonnais (City of Lyon).

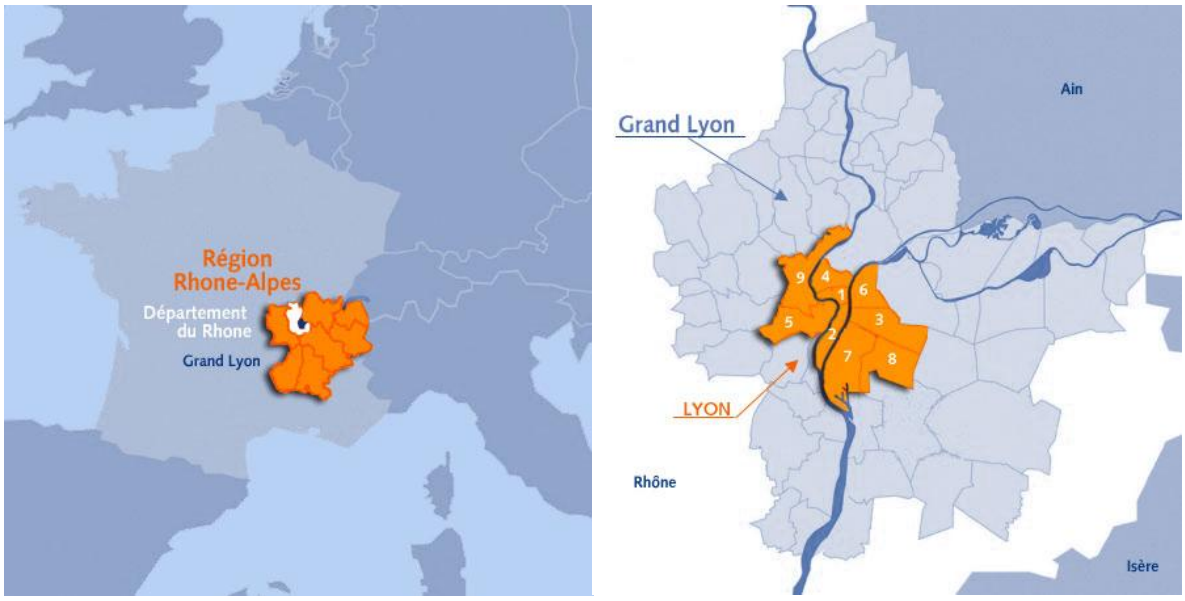

Figure 4-19 Administrative territories of Grand Lyon (City of Lyon)

Through the 17th and 18th century, Lyon was an important center of trade and its silk industry supplied the world. The expansion of the city was halt during the French revolution but the development started again under Napoleonic Empire and Lyon started to become an industrial city and pursued its urban development. In 1960, business quarter Part-Dieu was created in the city. Since 1980, a new drive to improve the city's infrastructure has been started. Important city planning projects have been completed in strategic locations while preservation of historical cultural assets was a policy. (City of Lyon) The city's historical inheritance which was confirmed by Unesco in 1998 is a major attractiveness factor (Thematic Committee, 2001).

The Grater Lyon is the center for banking, life science service, clean technology and digital companies, entrepreneurship and business service (Grand Lyon).

Table 4.5 shows some demographic and economic aspects of Greater Lyon.

Table 4.5 Demographic and economic facts for Greater Lyon

Boundary	Area Km^2	Population (2006)	Built area Km^2	GDP per capita € (2007)	Unemployment Rate (2007)
Greater Lyon	**500**[1]	**1,748,300**[2]	**954.19**[3]	**35,700**[2]	**7%**[2]

1. **(Grand Lyon Communaute Urbaine)**
2. **(Agence d'urbanisme, 2009)**
3. **(SPLAF)**

4.4.1. Current freight transport situation

Strategic location of The Greater Lyon makes it a gateway to Europe from north and south as can be seen in Figure 4-20. Located close to Germany and Switzerland, and in the corridor way between Paris and Marseille, the city is a "natural passage" for traveling to Italy, Mediterranean and Barcelona which connects Northern and Southern Europe (Grand Lyon Communaute Urbaine).

Figure 4-20 Lyon in Europe (Thematic Committee, 2001, p. 9)

In the following section, the transport network and freight related Nodes within Greater Lyon are introduced.

Road

Lyon is located in the middle of motorway junctions. As it can be seen in Figure 4-21, Brussels, Paris, Marseille, Barcelona and Frankfurt are connected through networks of motorways through Lyon. The region has 120,000 km of roads which put it above the national average. It includes 1100 km of freeways, 2743 km of national highways, 27,380 km of department roads and 88,772 km of town and country roads. In order to limit the number of vehicles passing through the city, bypasses were built around the metropolitan area. Eastern bypass of 62 km connects Anse (north of Lyon) to Ternay (south of Lyon) and the Northern bypass via the north ring-road of 10 km cross the metropolitan area from east to west (City of Lyon).

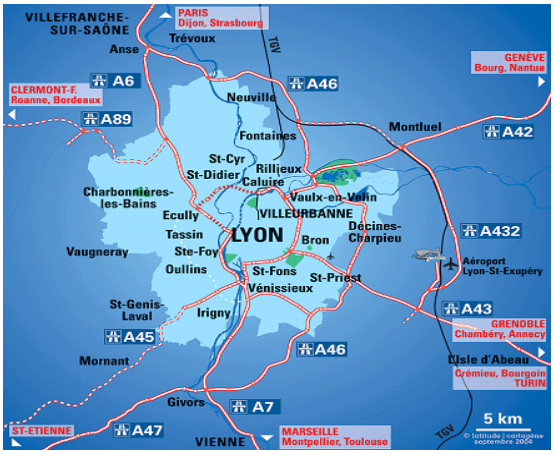

Figure 4-21 Lyon's freeways network (Only Lyon ADERLY)

Rail

Daily 46 TGV (high-speed train) and 75,000 passengers depart from three stations in the city (Grand Lyon Communaute Urbaine). The main railway stations are in Part-Dieu, Perrache and one is located in the airport as it can be seen in Figure 4-22 (European Rail Guide).The city of Lyon is going to construct a new TGV line between Lyon and Turin specifically for cargo transport. The TGV station built next to Lyon Saint-Exupery airport is planned to be the hub for high-speed trains to other European cities. (City of Lyon)

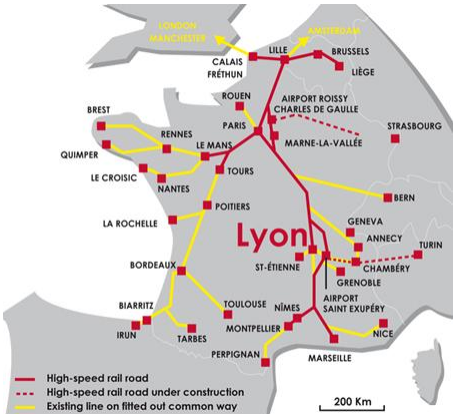

Figure 4-22 National TGV connections from Lyon (Only Lyon ADERLY)

Waterborne

The Rhone-Saone axis connects the Rhone-Alps region with Europe and Mediterranean countries. The Edouard Herriot port located in the south of Lyon was declared a *sea port* in 1979 and performs the role of a multimodal platform by immediate road and rail access as well as an oil pipeline (City of Lyon). In 2006, the port had a total traffic of 10 million tons of which 2.5 million tons were passed through pipelines, 250,000 tons by rail (mostly containers) and 1.4 million tons by river. Around 80% of goods arriving to the port are from Marseilles (Bibliotheque municipale de Lyon, 2008).

Lyon Terminal S.A- built in 1993 within the port of Lyon- is specialized in port handling and heavy lifts. The aim of Lyon Terminal is to develop river and rail supply in order to decrease pollution and greenhouse effects. Around 150,000 containers transited by this terminal during 2009 (Lyon Terminal, 2009).

Since 2008, it is planned to transfer 81,600 tons of goods from road to river yearly which is equivalent to 5850 trucks per year.

Air

Lyon Saint-Exupéry airport is located 25 km east of Lyon which serves a hundred cities and 70 international destinations. It is designed to be the second departure airport of France since it offers land availability and good connections with road and rail networks (Grand Lyon Communaute Urbaine). 146,500 tons of freight has been transported through Saint-Exupéry airport in 2009 (Agence d'urbanisme, 2009). In 2007, fast tram connected the airport to the business center of Part-Dieu and it was planned to double the capacity of the airport for 2010 (Grand Lyon Communaute Urbaine). With a site area exceeding 150 hectares, the Cargo Port is a multimodal one-stop-shop for all cargo activities (Lyon Ariports). The Lyon region also has a business airport located in Bronx.

Other freight related nodes

During 2009 the logistics space was almost 227,000 m^2 in total. In 2010, an area of 282,744 m^2 embedded trading, manufacturing and construction companies (Only Lyon, 2011). The major platform and multimodal logistics sites can be seen in Figure 4-23.

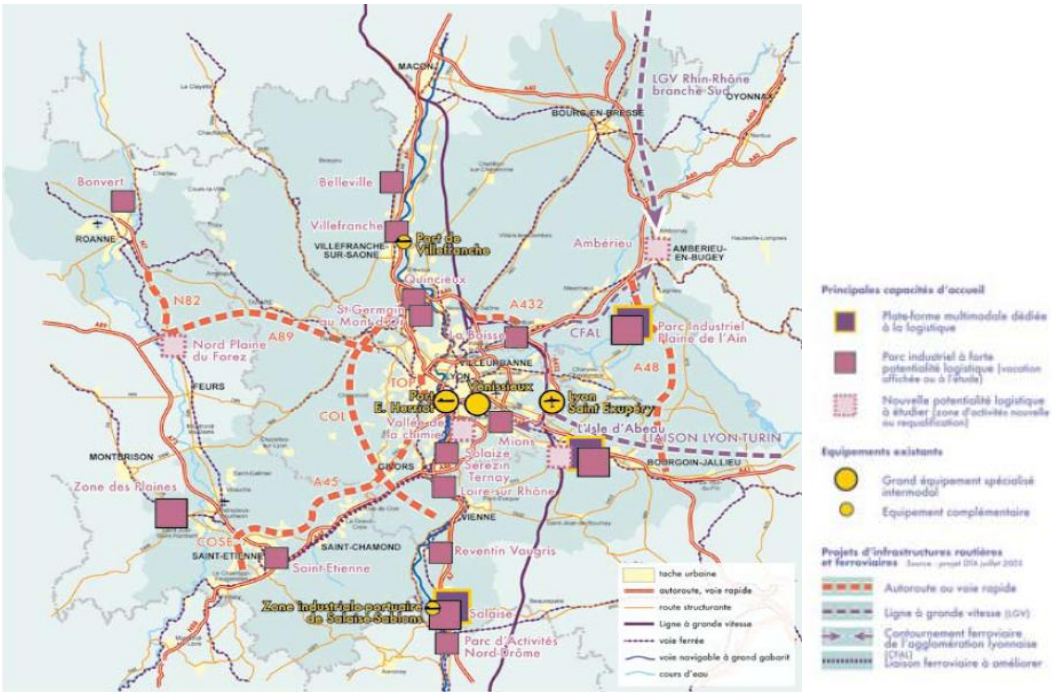

Figure 4-23 platforms and multimodal logistics major sites (Région Urbaine de Lyon, Agence d'urbanisme de Lyon - Opale, 2009, p. 5)

4.4.2. City planning

In the following sections the process of decision making and the involved bodies in city planning in Greater Lyon are introduced and the position of freight transport is reviewed. Further on some projects of regeneration within the area is presented.

Governance

As mentioned earlier, Grater Lyon is the capital of Rhone Department in the heart of Rhone-Alp region. Based on law, each of these administrative distinct (region, department and city) has different role in decision making process regarding land-use planning and freight transportation.

The Rhone-Alps region's main focus is on economic development and employment and also land development. The region defines the master plan for the development of its territory. It leads an environmental policy with regional natural parks, rural land planning, restoration of wetlands, etc. The region also organizes authority for passenger transportation and public rail transport. The Rhone department has responsibility regarding land planning issues which includes measures to improve roads, passenger transportation, rural and town facilities and environmental protection. (City of Lyon) It is also responsible for infrastructures, transportation, maintenance and development of part of the road network (departmental roads and some national highways), development and operation of commercial and fishing ports (Thoin, 2006). In the end comes Greater Lyon Urban Community which is responsible for (City of Lyon):

- Town planning and housing through master plan, zoning map, construction and renovation of housing and commercial zones
- Basic public services such as transportation, roads, household waste collection and treatment, wholesale food market
- Support for the economic development of the Lyon metropolitan area through assisting the economy through major changes and transformations and supporting projects for development in certain sectors

Different levels of administration are shown in Figure 4-24. Decisions regarding renewal/regeneration projects first are proposed in the region level. Region can just suggest changes but it does not have the power to make any decision. So these proposals are conveyed to lower levels in hierarchy to be decided on and to be invested. In order to set a regulation for Grand Lyon, the group of 58 communes as well as 9 districts should be convinced first (Caux, 2011).

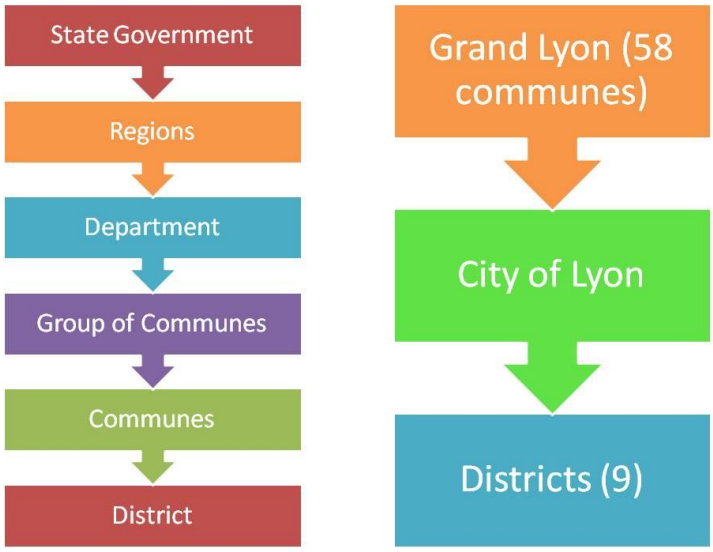

Figure 4-24 France Administration Levels (Caux, 2011)

The ownership of logistics facilities and warehouses is mixed between private and public sector. For changing the land-use of a private property, the public sector permission is required. However due to the logic of economic dynamic or employment creation, public sector is often ready to accept some exceptions and compromises (Routhier, 2011).

Land-use planning

Improving the quality of life and turn the city into an attractive and livable place is one of the main lines in Lyon City Development Strategy which is ensured by environmental related actions.

The other goals for the Greater Lyon are to achieve an integrated multi-level transport system, regeneration policies to make a new city from the old one and a "high environmental quality" city. (Thematic Committee, 2001)

Position of freight transport

Since 2005, Greater Lyon has been involved in the urban freight transport more actively. Beforehand, the only considered issue was food traffic to be managed and the trend was to locate the big warehouses far from the city. (Routhier, 2011)

At the moment there is only one person who is working directly in the subject of urban freight transport; however, there are many other people who are indirectly involved in different projects. Nevertheless the budget assigned to these projects is not known. Different software which is developed for assessment of freight transport is to be used in Lyon. One example is FretUrb which is part of a project called CityMove in European Union. This software is used to evaluate freight transport and delivery and pickups which occur in each zone of the city. This software is used in freight studies in Lyon in order to simulate the goods transport activity in several zones to study the impact of new vehicles, for example electric or hybrid vehicles (Routhier, 2011).

The interaction between public and private sector for freight transport in Grater Lyon is more voluntary. There is not any *freight plan* for Greater Lyon and this issue is mentioned very briefly in Lyon city plan and is more about general ideas and interest in this issue (Routhier, 2011). For instance the second course of action in the plan refers to the coherence logistics, optimization of flows and routs, and improvement of potential modal shift of goods to rail and river in order to limit truck traffic. However, public sector influences land-use planning and the location of logistics nodes through several leverages. First of all are *regulations*. There are rules in order to limit the economic dynamics (Routhier, 2011). However, it is not easy to ignore the economic factors (Caux, 2011). The main objective of economic factors is to develop the activities. There are some restrictions to avoid the pollution of water and soil but not much about the global effects (maybe just CO2 emissions). In addition generation of traffic is not taken into account. At the present there are lots of warehouses far from the city because there is no calculation of the effects of the generated traffic by those implementations (Routhier, 2011). Another important leverage is *land price* (Caux, 2011) which motive logistics companies to go far from cities (Routhier, 2011).

In addition, there are several associations which work on freight transportation (Routhier, 2011). One important association is "The Lyon Urban Region (RUL)" created in 1990 which is a forum for the Ain, Isère, Loire and Rhône départements, the Rhône-Alpes region and Greater Lyon, and the metropoles of Saint-Etienne, Vienne, Villefranche, Roanne, Broug-en-Bresse, for defining common land management strategies. Their focus is on important structural planning projects such as means of transportation, ports, business parks, development hubs and environmental issues. (City of Lyon) RUL defined an action as *Logistics Plan* for having a frame of reference in 1997. Some results of this action were to give priority to the multimodal transport, better organizing the reception of logistics and implementation of a development strategy (RUL, 2007).

Projects

Greater Lyon has implemented lots of renewal/regeneration projects in its territory. Projects mentioned below are some examples of them in order to clarify the position of freight transport in the area.

- ***Lyon Confluence Project***

  At the confluence of the Rhone and the Saone rivers, south of the Lyon peninsula, there was an area dedicated to industrial and transport activities. Now this area is the heart of one of the largest urban development projects in France. A significant part of the first development phase was completed. It is to renew 41 of the total 150 hectares over a period of 12 years (2003-2015). Out of the land-use mix of 400 000 m^2 of phase 1, 130 000 m^2 are dedicated to housing, 120 000 m^2 to shops, services, hotels and entertainment and 130 000 m^2 are in the service sector. (Lyon Confluence)

  As it can be seen in Figure 4-25, the area is a multimodal node with connection to rail, water and road network. However, this logistics area was moved from city center to 12 km outside. Nevertheless, no study was done on the traffic which was created by this location because at that time, it was very important to reserve this place for other activities and to improve the quality of life. The decision about this project was made about 2000-2002 when goods transportation was not considered as an important issue. (Routhier, 2011) Today, the

distribution of goods at the confluence (is referred to as *Last Mile Delivery*) and feeding of the new logistics platform at its new place has been solved but the conveyance of goods from the logistics node to confluence is still missing! (Caux, 2011)

In the Figure 4-26 the location of other renewal/regeneration projects in Lyon can be found.

Figure 4-25 Lyon Confluence area

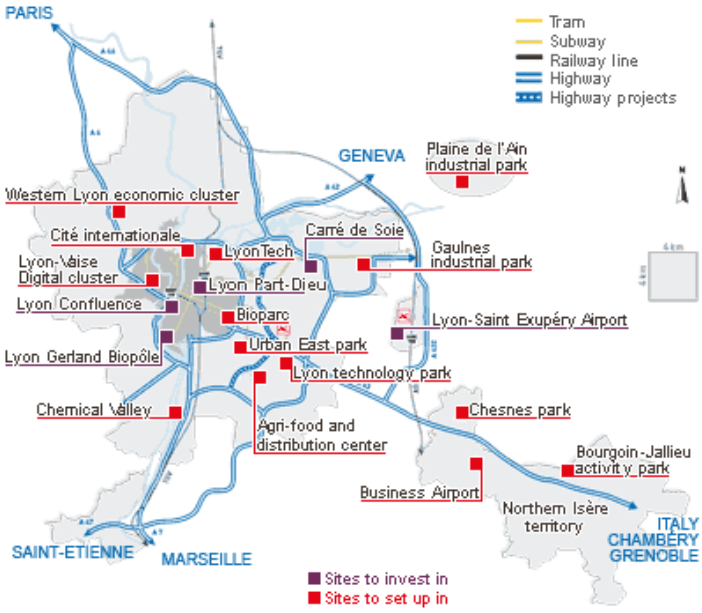

Figure 4-26 Real estate: map of setting up and investment opportunities (Grand Lyon)

- ***Development of Cargo Port of Saint-Exupéry airport***

  Aéroports de Lyon's policy is to invest in the development of its intermodal freight activities. Several projects have been defined in this regard. An important project is to increase access to the main Cargo port entrance and create traffic circles to service different zones by end of 2013. (Lyon Ariports)

5. Analysis

The analysis section is organized in five subsections. In the first four subsections each city is analyzed individually without concerning trends and phenomenon in other case cities. In each city first the urban form is presented through explanation of major transport networks and nodes. Then the influential drivers and barriers in different development projects are analyzed. In the fifth subsection a comparative analysis of the cities is presented in order to recognize the similarities and differences.

5.1. Gothenburg

Figure 5-1 illustrates the main roads in Gothenburg, E6, E20 which go from north to south and E45 and road 40 which connect the eastern areas of the city to the center and from there to the Port of Gothenburg.

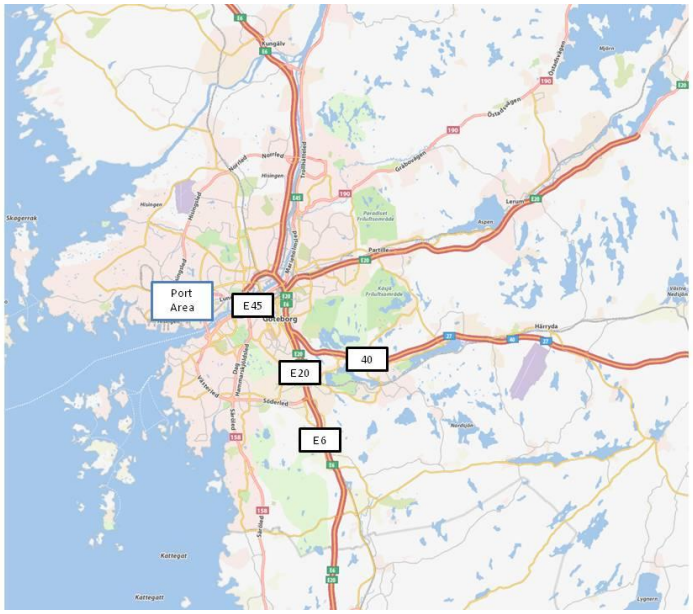

Figure 5-1 Gothenburg road map (Yahoo maps)

The port already has moved quite out of the city (Hagson, 2011); however, in order to improve Gothenburg position as Scandinavian Logistic Center, many projects regarding the development of port, its railway and sites for required logistics services are planned. (The city council, 2009) Rail transport is becoming more and more important especially in relation to the port activities and it is planned to increase the share of freight which are transported by rail. (Stadsbyggnadskontoret, 2009)

If the figure above is compared with Figure 4-6, it can be seen that transport companies and warehouses, industries and retail centers are located along the Göta River and/or close to the main roads which approve Ogden's (1992) point of view regarding closeness to the main roads, freeways and services. These areas are depicted in Figure 4-5 which are far from central Gothenburg. Based on Rodrigue et al. (2009) these areas are expected to have lower rent due to more available lands but at the same time, because of closeness to the main roads and gateways, those areas can provide a good accessibility to the market. These areas are supposed to be reserved for later business activities such as

industrial facilities, port activities, wholesale and retailing and not for any housing developments. (The city council, 2009)

The location of Gothenburg multimodal terminal and rail terminal in Gullbergsvass verifies criteria regarding closeness to network, customer and availability of land and labor mentioned by Ogden (1992). However, the current location of this terminal is in city center which based on accessibility theory might have a high rent and so, as Piskorz & Goulet (2009) argue might led to the relocation of this terminal in the future in order to free the land for more profitable activities or to increase the livability in city center. It will also results in decreased congestion, less noise and improved air quality. It is mentioned in Översiktsplan för Göteborg - Del 1 (2009) that the rail terminal in Gullbergsvass is to be moved to free room for later development projects and encourage the usage of rail instead of road. This relocation can affect the freight transport because of change of commodities, the location of departure and/or destination points, traffic flow, frequency and time of freight movements (Ogden, 1992) which also has a great influence on the length of journeys and choice of modes (Allen & Browne, 2010). On the other hand as Ogden (1992) argues, it affects the urban form and might lead to change in the usage of the approximate land as well as urban sprawl. Therefore, the new location of this terminal plays an important role in this regard. The optimum location of the terminal in relation to closeness to its customers and the possibility to exploit rail network are of great importance (Olsson, 2011) since it influences the land-use of the area and the traffic load and flow of the adjacent networks. In addition the initiate drive of this relocation is from public sector and although the market forces have a significant role in the selection of a new place of a terminal, it is not the main force in this project.

As it is mentioned in Gothenburg plan, the city aim is to be the logistics hub of Scandinavia which implies construction of new network infrastructures and/or more efficient use of the existing ones. On the other hand in Gothenburg Comprehensive plan, the city is planned to be developed in a sustainable manner to increase densities and to make effective use of limited land resources and raise the mix of uses. These two objectives seem to be contradictory yet they are manifested in projects which is being planned/ done in Gothenburg. One is The River Bank renewal project in which three shipyards and four port areas were free for other uses on Göta River bank in order to increase the livability of these areas. The release of port lands implies the graduate relocation of the port of Gothenburg to downstream. Ogden (1992) believes that although ports need to remain in their historical locations, they still may relocate alongside the river due to larger land availability or access to deeper water. This argument is true about Port of Gothenburg since the port is now quite out of the city to suits the increasing size of ships and to provide more space for containers.

The other project is the West Swedish Package which causes an immense change in the infrastructure as it is illustrated in Figure 4-7. The project description mainly focuses on rail and public transport and it seems that freight transport is not argued directly, however Allen et al. (2010) believe that infrastructure provision and management is one of the main ways for public sector to affect the freight transport. In other words, government affects the supply of transport in this way. Therefore the length of journeys, speed and choice of modes would be influenced. It also might influence on the location of existing/ new freight facilities and companies (Olsson, 2011) due to increased accessibility and closeness to infrastructures which in turn affects the traffic flow, alteration of commodities, frequency and time of

freight transport (Ogden, 1992). Availability of infrastructures is one of urban sprawl drivers as well. (European Environment Agency, 2006)

5.2. Hamburg

City of Hamburg is located at the Elbe river and historically has developed around the port as the core industry of the area. The shape of the Elbe river and the location of the port in the vicinity of the city centre have given a special urban form to Hamburg. As it can be seen in Figure 4-11 due to the high flow of freight movement to and from the port area, major rail and road freight routes are passing through the city quite close to the city centre.

Hamburg is obviously aiming at improving its role as the logistic hub in northern Europe. The establishment of Logistic Initiative Hamburg with the close cooperation of public and private sector is one of the big steps toward this goal. In addition Hamburg spatial vision particularly addresses logistic and port industries and their land requirements to expand and strengthen competences in these sectors. The increasing demand for logistic lands in Hamburg (the most attractive location in Germany) is an illustration of growth within port-related services and industries.

However global changes in transport organization and the shift from manufacturing to service, media and information industries has put the port's competitiveness and its benefits for the city into controversy. It is argued that the port of Hamburg as a river port is not capable of competing with close costal ports considering the growing size of ships and tidal restrictions. This will eventually shift a considerable flow of freight toward neighbouring ports such as Wilhelmshaven. In addition, the projects for expansion of the port are conflicting with urban development strategies and projects. First of all port and city development projects are competing financially. Secondly the external impacts of the port such as traffic congestion, noise and land consumption have negative effects on the quality of life and the city attractiveness as the ultimate goals of city development and renewal projects (Grossmann, 2008). Neuman (2011) also considers the urban development guidelines to be one of the obstacles in front of the development of logistic lands.

While some central areas with considerable freight flow generation are released and going to be used for other purposes, new areas are allocated to logistic usages with quite distance from the city center though close to the rail and road networks. Here again the question of logistic lands' external effects on their surroundings can be noted which consequently has stopped two logistic sites. The location of the suggested logistic site at Heimfeld meets all conditions stated by Ogden (1992) which is mentioned in section 2.5.2 .This area is very close to the A7 motorway and through that has a very good accessibility to the south Germany. With less than 20 km to the city centre it also fulfils the labour availability and customer closeness. However the land provision will damage the green landscape in that area and that is when nonmarket forces interfere against the economy forces to totally stop the project.

On the other hand connecting the north and south of Elbe river is an urban development concept which aims at improving Hamburg urban image especially within southern parts of the river and changing those places to attractive addresses to live and invest. Nevertheless southern parts of Hamburg are attractive locations for logistic activities concerning the accessibility to the port, city centre, main road

and rail infrastructures and ports of Wilhelmshaven and Bremerhaven. The location of logistic sites (Figure 4-12) is also in alignment with this statement. The same argument can be valid here as these two types of development projects will conflict as long as the external effects of the freight transport are concerned.

As a part of the project "Leap across the river Elbe" the city is the subject of the biggest urban development project in Europe, Hafencity. Transformation of formerly port area to a mix of residential, office, retail and service activities will lead to new types of transportation needs, including freight transport in terms of type of commodities, size and frequency of deliveries. As Ogden (1992) mentions the need for freight deliveries should be taken into account in planning and design stages. In addition, since this is a long term project with the perspective of 25 years which is involved a great amount of construction the effects of required construction freight transport should be considered. The closeness to the city centre magnifies the external effects of freight transport in the area in term of congestion imposed to the close road infrastructures, noise and air quality. However freight transport is not addressed directly within the master plan and the shift from road to rail and water transport is only emphasized for transportation of passengers.

5.3. London

As it is shown in Figure 4-15 London road infrastructure consists of concentric road belts around the city centre which are connected trough radial roads. M25 motorway, the outer road belt, is almost located on the border of Greater London with the purpose of reducing the congestion within London borders. M25 connects London main airports at Heathrow, Gatwick, Stansted and Luton and stands for the highest daily flow of heavy good vehicles among all freight routes within Greater London. Three radial motorways (M1, M4 and M11) connect the motorway to a group of roads which built another belt with less distance from the city centre. This circular design of roads prevents unnecessary movements of freight vehicles within inner parts of the city. Despite of quite symmetric shape of M25 motorway the flow of good movement is higher in the roads toward north eastern, northern and north western parts. This presents the higher demand of transportation toward northern areas which quite corresponds to the freight rail network as it is shown in Figure 4-16 and also explains the location of radial motorways (M1, M4 and M11).

As it is discussed in section 4.3.1, London is facing a significant change in type of industrial land from general industry to warehousing and waste management. According to Figure 4-17 the net demand of industrial land within the Greater London is negative which means appearance of empty spaces inside the city borders. However, geographical analysis of demand shows further movement of logistic properties outside city borders. This phenomenon can be explained by the tendency of logistic industry to move toward main roads as in case of Lea Valley (between M1 and M11) and Park Royal (between A40, M4 and A4) or main transportation hubs (as in Heathrow and Thames Gateway areas) in order to have access to broader market areas as well as labour. This structural change from manufacturing to service industry along with the site preference of logistic facilities will affect the type of freight movement within the urban area as well as the length of journey and transport solutions (Ogden, 1992) (Allen & Browne, 2010). In addition since the official borders of the city has no significant effect on demand of land for warehousing and logistic activities it is expected to contribute to the urban sprawl.

The movement of logistics land demand toward city fringe also shows that the negative demand of industrial land has no effect on reducing the land price or at least not enough to keep the demand in inner parts of the city. This proves that there are other economic activities which can make higher profits by being present in central areas. This change of land use will also affect the flow and type of commodities transferred within the urban area (Ogden, 1992).

It can be seen that the relocation of warehouses and logistic facilities within the Greater London is mainly initiated by market forces and economical factors although the government affects the site selection through its monopoly in provision of the infrastructure. As Steele (2011) mentions, land use is only controlled by public sector to some extent and the government only intervenes in cases where the public interest is threatened. Some examples of such cases which directly affect the freight transport are waste management facilities, food supply chains and multimodal urban distribution. Protection of food wholesales markets and waste management facilities seem to be critical in particular due to the size of the city otherwise it would not be possible to ensure the efficiency of transport within the city centres in the future redevelopments.

Although the government does not directly interfere in redevelopment projects and freight issues related to them, the guidelines and recommendations within London Plan tries to bring the freight issues more into the decision making processes concerning land use planning and to justify the resources needed. The guidelines of London Plan are in a strategic level and supposed to be realized in local level within boroughs. But comparing two different redevelopments of Croydon Borough and Olympic site in Lower Lea Valley shows that realization of strategic guidelines may be different in operational level based on the considered priorities.

The Olympic site project is a multipurpose redevelopment project which claims to provide an infrastructure platform for future developments of the area. The project's effects on freight transport can be analyzed in two different time scales. The short term effects concerns the relocation of logistic centres which can affect the way freight transportation is done in the area in term of length of journeys and efficiency as well as locations affected by the transport external impacts such as congestion and noise. It can be discussed that there is no direct market driver behind this movement; but this argument only refers to the logistic premises and does not consider the drivers behind the selection of Olympic site's location. As an infrastructure platform this project has inevitable effects on freight transport since it decides the future destinations of freights in the area. The long term consequences however might not be easy to adjust later on as it is stated by Steele (2011).

5.4. Lyon

Lyon has a strategic location in Europe. As it can be seen in Figure 4-20, Lyon is connected to Paris, Genève, Marseille and Vienne through highways A46 and A6, A42 and A7 respectively. There are also two bypasses around the metropolitan area which join north to south and east to west of Lyon in order to decrease the number of vehicles passing through the city. It can be implied from different projects in Herriot Port and along the Rhone-Saone axis that multimodal transport is encouraged in Lyon and there are tryouts to shift goods transport from road to rail and river. This trend can also be seen in the construction project of a new TGV line close to Lyon airport to be a hub for high-speed trains in Europe.

(City of Lyon) In addition, the river is planned to become a space to be exploited for transport of goods. (Grand Lyon communaute urbaine, 2008)

Figure 4-23 illustrates that platforms and multimodal logistics sites are mainly located close to Rhone and Saone river, TGV stations, airport and main roads which is in line with what Ogden's (1992) says regarding the importance of closeness to infrastructure for freight facilities and shows the importance of market forces in the first place. It also can be noticed that the concentration of these nodes is adjacent to the corridor between Paris and Marseille and around the bypasses which shows the transit position of the city as a gateway. Yet due to the high rent of land in city center (Rodrigue, Comtois, & Slack, 2009) these nodes have been located away from central areas. Figure 5-2 shows a closer view of the location of freight nodes.

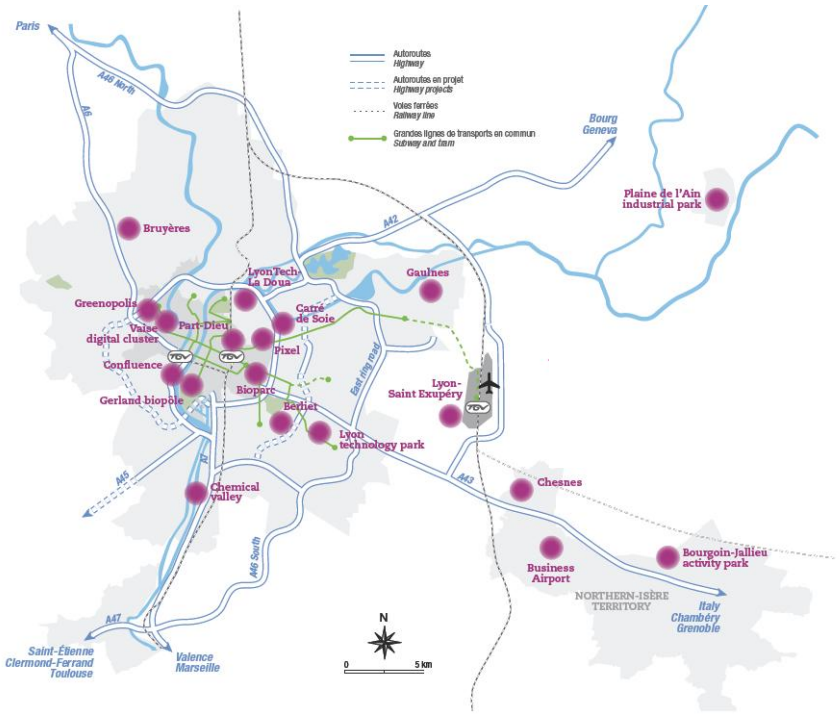

Figure 5-2 Lyon freight nodes (Only Lyon, 2011, p. 64)

As a result of global trends, the industries in Lyon are shifting towards information technology and development of services and multimedia. Rodrigue et al. (2001) believe that the improvements in information technology led to E-commerce which needs large warehouses outside of metropolitan area and smaller but more trucks and/or vans to different destinations. This phenomenon is expected to be seen in Lyon which leads to more frequent and longer transportation.

As it is mentioned in City Development Strategy and in alliance with European Union, the city of Lyon seeks to raise the quality of life through the urban renewal policy and improvement of environmental quality. The aim of renewal policy as Piskorz & Goulet (2009) argue is to reduce urban sprawl which has been an undesirable trend in European cities. One example of renewal strategy in Lyon is the confluence

project. This area was basically a multimodal node which was decided to be renewed in order to increase land-use mix and therefore, this logistics node was moved to a new place; however, the effect of this relocation on freight transport was not studied in advance. The relocation of a freight node based on Allen & Browne (2010) influences on the length of journey, speed and selection of modes. This alteration also affects the location of origin and destination and traffic flow in addition to its contribution to urban sprawl (Ogden, 1992). In this case, the unseen results were problems in feeding the new logistic platform as well as confluence, in addition to the distribution of goods within the confluence area. Among these issues the link between the new logistics node and confluence is still missing.

In Lyon the interaction between public and private sector for freight transport is voluntary. Routhier (2011) and Caux (2011) who are involved in freight transport issues in Lyon, argue that public sector affects on the location of freight nodes first through regulations in contrast to economic forces which verifies Allen et al. (2010) argument about setting the regulation by government to either limit the infrastructure and vehicles usage or control and decrease the undesirable effects of them. The second leverage of government in the city is land price. Based on Rodrigue et al. (2009), land price is a function of market forces; however, governments can interfere in it through investment incentives (Dicken P. , 1986) which is the case in Lyon.

5.5. Comparative analysis

In this section, the case cities are compared in order to find the similarities and differences as well as whether there is a trend which has been repeated among the four cities. The section is divided into four main areas as relocation trends, land-use planning, public private partnership and the position of urban freight transport.

5.5.1. Relocation trends of freight related nodes

There has been no major relocation of seaports and airports in the cities studied in this thesis which is in line with Ogden's (1992) point of view regarding this issue. He argues that although the relocation of freight related nodes is inevitable due to the lack of space for expansion in city centres and change of market positions, such activities as port terminals cannot or should not always move. If Port of Gothenburg be considered, it is seen that its location has slightly moved in order to access deeper water and more space for containers handling. Port of Hamburg also is facing the same problem; however slight movement of the port cannot solve the problem of serving big-size ships in Hamburg. In this case, there are examples of large shipping companies who have left Hamburg to Bremerhaven and Wilhelmshaven.

In case of multimodal terminals in Lyon and Gothenburg, the relocation is either done or planned in order to free the land for renewal projects and improving the quality of life in central areas. In Lyon, the relocation decision was made approximately 10 years ago and the terminal was moved 12 kilometers to south of Lyon. Similar scenario is going to happen in Gothenburg as the multimodal terminal in Gullbergsvass is planned to be relocated to a place far from the city center. The decision regarding the new place has not been finalized yet but Sävenäs at 7 kilometer from the city center is one candidate.

In case of other freight related nodes, a general trend of moving toward urban fringe can be noticed. In London, the demand for logistics lands is increasing around the city boundaries and beyond. The demand is much higher in the northern parts of urban area alongside of major motorways. As Ogden (1992) mentions, closeness to transport networks is the main factor in selection of logistics sites. In Lyon and Hamburg, these facilities are located or planned close to main motorways and railroads. In Gothenburg, they are mainly concentrated along the Göta River, E6 and E45 motorways.

5.5.2. Land use planning trends

Ogden (1992) mentions the redevelopment and urban renewal is one of the consequences of relocation of activities from the inner parts of the city. This issue has been noted in all case cities spatial planning. In Hamburg, the released lands inside the city from army, post and most importantly port were the main reason to introduce new urban development concepts as "Leap across the river Elbe" which covers a big area from the Haftencity to Wilhelmsburg toward Harburg. In Gothenburg as well, the released lands from the port and former shipyard areas have been the subject to a large renewal project which covers the north and south bank of Göta River. This trend has been noticed in Lyon in which a former multimodal terminal has been moved out of the city aiming at redeveloping the area into a more attractive place to work and live. In London, a great amount of industrial lands are released within the city areas which are permitted to be changed for other usages especially residential. One of the examples is redevelopment of Croydon Borough with the purpose of improving the quality of life.

5.5.3. Position of freight transport

Among all case cities, in London freight transport seems to have a better position in city planning decisions. With 10 full-time people working directly on freight transport, London is far ahead of other cities concerning public authorities. In addition, London Plan has clear references to freight transport in redevelopment projects and a separate freight plan is published to address the freight issues within London boundaries. Although Logistic Initiative Hamburg is not totally owned by public sector, this organization has a significant role to improve the logistics position of Hamburg and bring the freight related issues into decision making processes of the city planning. The freight issues are also addressed in both federal and local planning; however, there is no specific freight plan as it is the case for London. In both Lyon and Gothenburg, there is one person who works directly on freight transport issues and in none of these cities, a separate freight plan is available and freight transport is only slightly mentioned in the form of general guidelines in their city planning.

5.5.4. Public Private Partnership

Public private partnership as Browne et al (2004) describe, refers to information exchange, cooperation and communication between public and private sectors. Since this definition is quite broad, the concept might take various forms in different cities and situations. In case of Hamburg, it has a very clear structure which is realized in establishment of Logistic Initiative Hamburg. This organization clearly refers to public and private sectors and tries to bring all information from different parties into a common exchange point called central cluster management. In Gothenburg, the partnership is not as structured as the case of Hamburg. It is a network which is called Local Freight Network and is formed around seasonal meetings with aim of exchange of information and improvement of cooperation between various stakeholders. The Lyon Urban Region (RUL) is a forum for defining common land

management strategies and mainly focuses on important structural planning projects. The situation in London is quite similar to Gothenburg and Lyon which has a voluntary basis; however, no specific forums or gatherings were noted in this case.

6. Concluding Discussion

Cities are the locations of production, consumption and distribution activities linked to movements of freight which calls for urban freight transport. Different nodes within cities are associated with different amount of freight transport. Nodes such as city centers, manufacturing and industrial zones as well as commercial areas are representing the highest generated freight within an urban area.

Freight generating nodes are always affected by different forces to change their location. These forces may stem from global trends such as shift from manufacturing to service industries, shift from mass to customize production, lean and just-in-time concepts, information technology, centralization and technological innovations. On the other hand national policies and regional market dynamics are another group of forces affecting the location of freight generating nodes. In this group land price, vicinity to the transport network, provision of infrastructure, government incentives etc. can be recognized.

To fulfill the purpose of the study and to map the case cities based on their logistics nodes and flows, first the study boundary of each city is defined. Then the freight transport gateways within the boundary are mapped and finally the land-use map of the city is used to identify the main freight generating nodes. To complete the whole picture, the map of the main freight transport networks within and around the city is presented as the representative of major flows within urban area.

In all case cities the movement of freight generating nodes is noticed. The general trend of movement is toward city fringes. The change in industry nature from heavy to light and services is noticed as one of the reasons behind relocations. However, extent of government intervention in studied relocations is different in each city.

The movement to the outer parts has led to open areas inside the city which are the subject of different renewal projects. Renewal projects mainly aim at retrieving the livability of the city centers and attracting the investments. However in case of transport terminals in Gothenburg and Lyon the external effects of the terminals such as air-pollution, congestion etc. was the main force to move them from the city center i.e. the renewal projects led to the relocation. These phenomena are considered as two of the main land-use planning trends in all case cities.

Although sea and air ports are the least likely nodes to move, slight relocation of sea ports are noticed in port cities Hamburg and Gothenburg, mainly due to the requirement of shipping industry. This is while closeness of the port to the city center is considered as a challenge to achieve the expected quality of life in these cities and a barrier to the city development projects.

To summarize the position of freight transport in the case cities, it is noticed that while city development and urban freight transport are interacting in so many levels and the influence of one on the other is inevitable, the notion of freight transport within spatial planning of the cities is not as significant. Most of the case cities are lacking a clear freight policy within their city plan let alone a separate freight plan. Even in London which is far ahead of the other case cities in the freight transport involvement, the subject is not highlighted in the city plan and still in some projects it is ignored to a

high extent. However, the contradictions between private and public sector in urban freight transport have recently resulted in a new concept as Public Private Partnership which is noted in all case cities though in different extents. The aim is to gather and share all information from different actors and align different activities by increased cooperation.

As mentioned above, several similar patterns concerning the relocation of freight generating nodes can be recognized among the case cities which have resulted in similar pattern of city development and land-use planning. However - as it is discussed particularly in each project - depending on the characteristics of each city these patterns can be different in size and details.

7. Suggestions for further studies

What has been shown in this thesis is that how the freight generating nodes are moving as cities develop. Since the freight transport is an industry with many different actors, the next step could be to study how each and every actor is affected when a specific node relocate.

In this study the government structures are introduced for case studies to some extent. However these structures are not compared to each other in order to see if different governmental structures can result in different positions for freight transport.

One problem which is noticed in this study is the lack of common indicator for freight capacity of the nodes and networks. In order to improve the comparison between different modes and different cities it is suggested to gather data in similar formats.

Among all case cities, Gothenburg is lacking extensive freight information in term of capacities in gateways and network. To collect these types of information will improve the study of freight transport in the area significantly.

In this study, the access to energy, energy price and their influence on freight transport is not considered. Since currently the subject of energy is becoming more critical, it is valued to study how the access to energy can be used as a measure to affect urban freight transport.

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